D-Link 1U 4-bay rackmount unified storage User Manual

DNS-1560-04

Version 1.00
April 2014

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Login information

User name: admin
Password: 1234

Preface

About this manual

This manual is the introduction of a D-Link unified storage system and it aims to help users know the operations of the disk array system easily. Information contained in this manual has been reviewed for accuracy, but not for product warranty because of the various environments / OS / settings. Information and specification will be changed without further notice.

Before reading this manual, it is assumed that you are familiar with computer skills such as hardware, storage concepts and network technology. It is also assumed that you have a basic knowledge of Redundant Array of Independent Disks (RAID), Storage Area Network (SAN), Network-Attached Storage (NAS), Internet SCSI (iSCSI), Serial-attached SCSI (SAS), Serial ATA (SATA), technology.

CAUTION:
Do not attempt to service, change, disassemble or upgrade the equipment's components by yourself. Doing so may violate your warranty and expose you to electric shock. Refer all servicing to authorized service personnel. Please always follow the instructions in this user manual.

Tips and Cautions

This manual uses the following symbols to draw attention to important safety and operational information.

Symbol	Meaning	Description
	TIP	Tips provide helpful information, guidelines, or suggestions for performing tasks more effectively.
	CAUTION	Cautions indicate that failure to take a specified action could result in damage to the software or hardware.

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Conventions

The following table describes the typographic conventions used in this manual.

Conventions	Description
Bold	Indicates text on a window, other than the window title, including menus, menu options, buttons, fields, and labels. Example: Click **OK** button.
<*Italic*>	Indicates a variable, which is a placeholder for actual text provided by the user or system. Example: copy <source-file> <target-file>.
[ ] square brackets	Indicates optional values. Example: [a | b] indicates that you can choose a, b, or nothing.
{ } braces	Indicates required or expected values. Example: { a | b } indicates that you must choose either a or b.
| vertical bar	Indicates that you have a choice between two or more options or arguments.
/ Slash	Indicates all options or arguments.
underline	Indicates the default value. Example: [a | b]

FCC and CE statements

FCC statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below and as indicated in the measurement report number: xxxxxxxx-F

Technical Standard: FCC Part 15 Class A (Verification)
IC ICES-003

CE statement

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards and Specifications listed below and as indicated in the measurement report number: xxxxxxxx-E

Technical Standard: EMC DIRECTIVE 2004/108/EC
(EN55022 / EN55024)

UL statement

Rack Mount Instructions - The following or similar rack-mount instructions are included with the installation instructions:

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1. Elevated Operating Ambient - If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.
2. Reduced Air Flow - Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
3. Mechanical Loading - Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
4. Circuit Overloading - Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. Reliable Grounding - Reliable grounding of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

CAUTION:
The main purpose of the handles is for rack mount use only. Do not use the handles to carry or transport the systems.

The ITE is not intended to be installed and used in a home, school or public area accessible to the general population, and the thumbscrews should be tightened with a tool after both initial installation and subsequent access to the panel.

Warning: Remove all power supply cords before service

This equipment intended for installation in restricted access location.

- Access can only be gained by SERVICE PERSONS or by USERS who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken.
- Access is through the use of a TOOL or lock and key, or other means of security, and is controlled by the authority responsible for the location.

CAUTION: (English)
Risk of explosion if battery is replaced by incorrect type. Please replace the same or equivalent type battery use and dispose of used batteries according to the instructions.

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ATTENTION: (French)
IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACÉE PAR UNE BATTERIE DE TYPE INCORRECT. METTRE AU REBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS.

VORSICHT: (German)
Explosionsgefahr bei unsachgemaßem Austausch der Batterie. Entsorgung gebrauchter Batterien nach Anleitung.

ADVERTENCIA: (Spanish)
Las baterías pueden explotar si no se manipulan de forma apropiada. No desmonte ni tire las baterías al fuego. Siga las normativas locales al desechar las baterías agotadas.

警告: (Simplified Chinese)
本电池如果更换不正确会有爆炸的危险，请依制造商说明处理用过之电池。

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Overview

Product Overview

This user manual describes how to set up and use the storage systems.

DNS-1560-04:

1U4bays

Package Contents

DNS-1560-04:

The package contains the following items:

- D-Link storage system (x1)
- HDD trays (x4)
- Power cords (x2)
- Rail kit (x1 set)
- Keys, screws for drives and rail kit (x1 packet)

Hardware

This section provides basic information about the hardware components.

DNS-1560-04:

(1U4bays)

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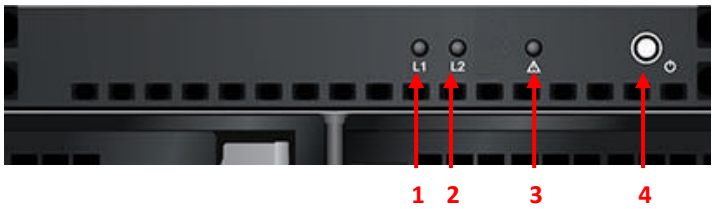
Front View

There are three LEDs and one button on DNS-1560-04



This table provides details about the button and LEDs.

Number	Description
1	LAN1(Management port) LED: • Blinking amber: Accessing data.
2	LAN2 LED: • Blinking amber: Accessing data.
3	Status LED: • Blinking amber: System error.
4	Power button. • Blue: Power on.

Disk Drive Assembly

Remove a drive tray. Then install a HDD.

The front of each disk tray has four components:

This table provides details about the front components of a disk tray.

Number	Description
1	Status LED: • Green: The hard drive is inserted and working normally. • Amber: The hard drive has failed. • Blinking amber: The hard drive data is being rebuilt. • Off: There is no hard drive in the tray or the power is off.
2	Access LED: • Blinking green: The hard drive is being accessed. • Off: The hard drive is not being accessed or there is no hard drive in

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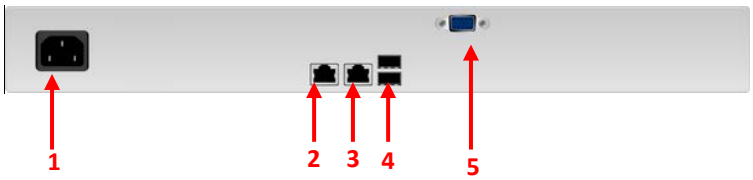
	the tray.
3	Tray removal handle.
4	Latch to release the tray and tray handle.

Rear View

DNS-1560-04 (2 x GbE ports):



This table describes the rear components.

Number	Description
1	Power Connector.
2	LAN1 (GbE) and management port.
3	LAN2 (GbE) port.
4	USB ports.
5	VGA port.
LED	GbE Activity LED: • Blinking green: The system is transmitting or receiving to/from an Ethernet device through the 1G port. • Off: The system is not transmitting or receiving to/from an Ethernet device through the 1G port. GbE Connection/Speed LED: • Green: The GbE port is connected at 100 Mbps. • Yellow: The GbE port is connected at 1 Gbps. • Off: The GbE port is connected at 10 Mbps or there is no connection.

RAID Concepts

RAID is the abbreviation of Redundant Array of Independent Disks. The basic idea of RAID is to combine multiple drives together to form one large logical drive. This RAID drive obtains more performance, capacity and reliability than a single drive. The operating system detects the RAID drive as a single storage device.

RAID Levels

There are various RAID levels with different degrees of data protection, data availability, and performance. A description of supported RAID levels follow:

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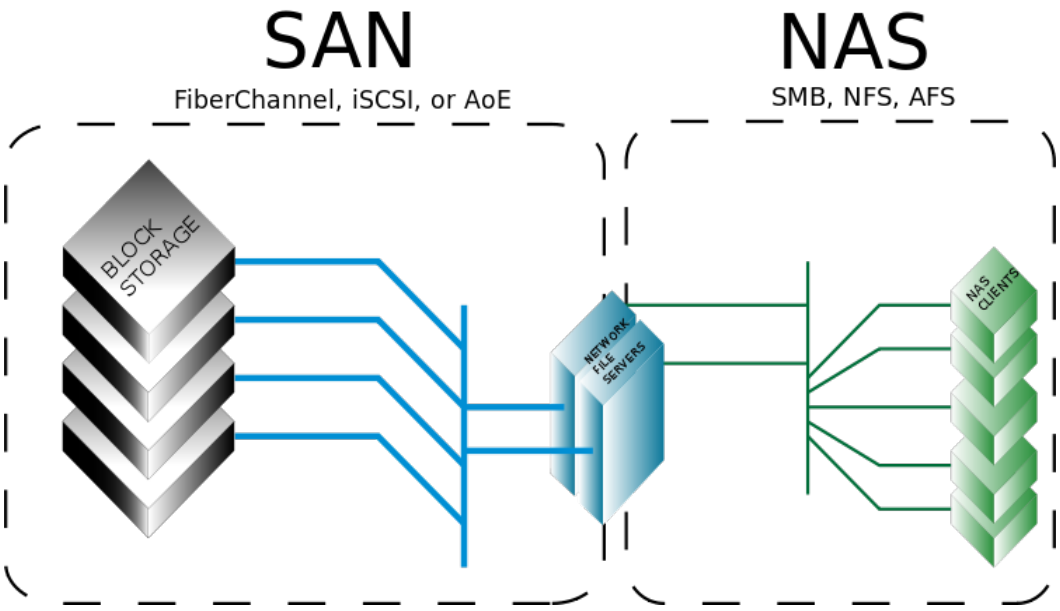
Type	Description	Min. No. of Drives
RAID 0	Disk striping.	1
RAID 1	Disk mirroring over two disks.	2
RAID 5	Striping with interspersed parity over the member disks.	3
RAID 6	2-dimensional parity protection over the member disks.	4
RAID 50	Striping over the member RAID 5 volumes.	6
RAID 60	Striping over the member RAID 6 volumes.	8

NAS Concepts

NAS (Network-Attached Storage) is file-level computer data storage connected to a computer network providing data access to heterogeneous clients. NAS uses file-based protocols such as NFS (popular on UNIX systems), SMB/CIFS (Server Message Block/Common Internet File System) (used with MS Windows systems), or AFP (used with Apple Macintosh computers). NAS units rarely limit clients to a single protocol.



NAS provides both storage and a file system. This is often contrasted with SAN (Storage Area Network), which provides only block-based storage and leaves file system concerns on the "client" side. SAN protocols are SCSI, Fibre Channel, iSCSI, ATA over Ethernet (AoE), or HyperSCSI.

One way to loosely conceptualize the difference between a NAS and a SAN is that a NAS appears to the client OS (operating system) as a file server (the client can map network drives to shares on that server) whereas a disk available through a SAN still appears to the client OS as a disk, visible in disk and volume management utilities (along with client's local disks), and available to be formatted with a file system and mounted.

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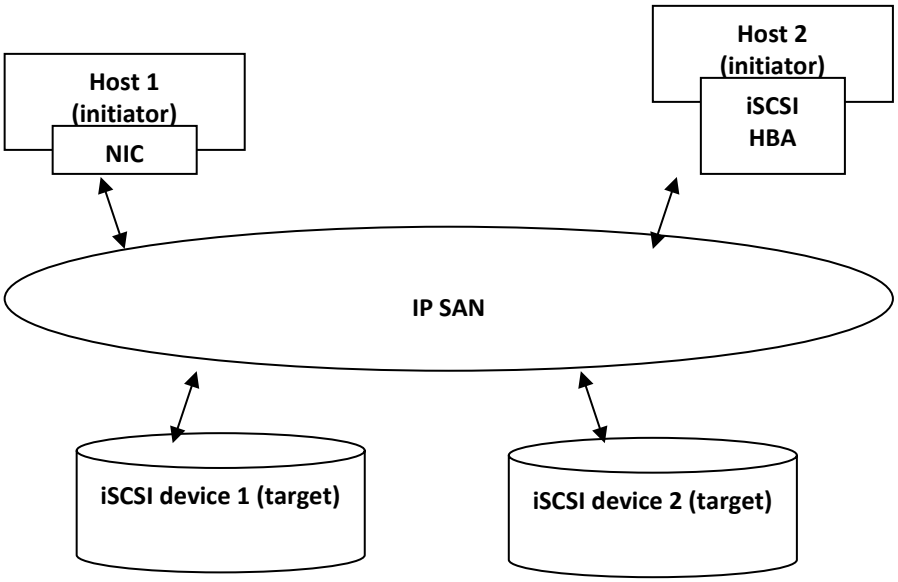
iSCSI Concepts

iSCSI (Internet SCSI) is a protocol which encapsulates SCSI (Small Computer System Interface) commands and data in TCP/IP packets for linking storage devices with servers over common IP infrastructures. iSCSI provides high performance SANs over standard IP networks like LAN, WAN or the Internet.

IP SANs are true SANs (Storage Area Networks) which allow several servers to attach to an infinite number of storage volumes by using iSCSI over TCP/IP networks. IP SANs can scale the storage capacity with any type and brand of storage system. In addition, it can be used by any type of network (Ethernet, Fast Ethernet, Gigabit Ethernet, and 10 Gigabit Ethernet) and combination of operating systems (Microsoft Windows, Linux, Solaris, Mac, etc.) within the SAN network. IP-SANs also include mechanisms for security, data replication, multi-path and high availability.



Storage protocol, such as iSCSI, has “two ends” in the connection. These ends are initiator and target. In iSCSI, we call them iSCSI initiator and iSCSI target. The iSCSI initiator requests or initiates any iSCSI communication. It requests all SCSI operations like read or write. An initiator is usually located on the host side (either an iSCSI HBA or iSCSI SW initiator).

The target is the storage device itself or an appliance which controls and serves volumes or virtual volumes. The target is the device which performs SCSI command or bridge to an attached storage device.

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Installation

Installation Overview

Before starting, prepare the following items:

- A management computer with a Gigabit Ethernet NIC (recommend) on the same network.
- Connection cables:
  - CAT 5e, or CAT 6 (recommend) network cables.
- Prepare a storage system configuration plan by the network administrator. The plan should include network information for all network ports. If using static IP addresses, please prepare a list of the static IP addresses, the subnet mask, and the default gateway.
- Switches
  - **:** Gigabit switches (recommended). Or Gigabit switches with VLAN / LCAP / Trunking (optional).
- CHAP security information, including CHAP username and password (optional).

Drive Slot Numbering

The drives can be installed into any slot in the enclosure. Slot numbering is reflected in Web UI.

Slot 1	Slot 2	Slot 3	Slot 4

System Installation and Deployment

Using the following instructions to install and deploy the storage system.

- Install the Rail Kit onto the unit and insert it into the rack.

CAUTION:
The system is very heavy. It's recommend that a mechanical lifter or at least two persons be used to raise and align the system to prevent injury during installation. Use care when inserting or removing a system into or out of a rack to prevent the accidental tipping or the rack causing damage or personal injury.

- Install the disk drives.

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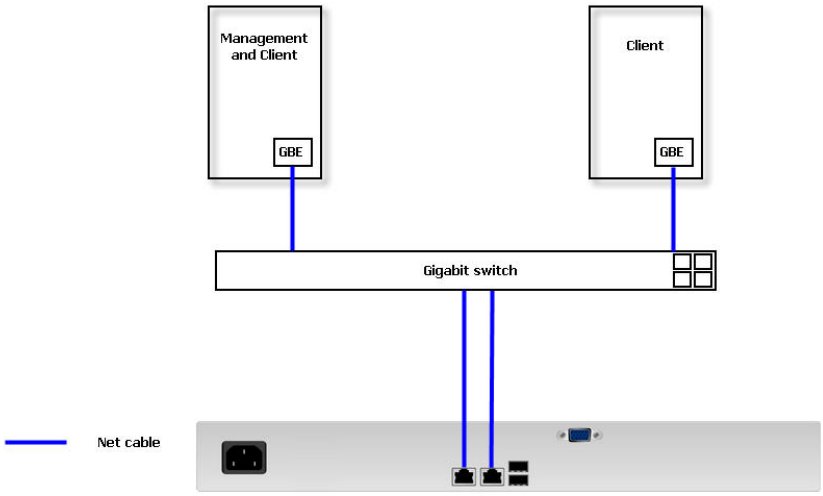
- Connect the management port cable and data port cables on the network plan, the topology examples are on the following.



Power ON / OFF

Power on the System

The power button is located at the front of the panel. To turn the system ON, press power button. After you turn the power ON, the system performs a booting process which takes a few minutes.

Power off the System

It can shutdown via Web UI or management software.

Shutdown using Web UI

Using the Web UI:

- Select **Maintenance -> Shutdown**.
- Click the **Shutdown** button.
- The power LED will display blue blinking, and then power off.

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Quick Setup

Management Interfaces

There are several management methods to manage the storage system, described below.

Web UI

For remote management, the unified storage system uses a web graphic user interface for operation. It supports most common web browsers. Be sure to connect the LAN cable to the management port of the system.

The web UI can be accessed via every network interface, but D-Link still defines a management port. The default IP of the management port setting is DHCP; check the LCM to find the IP address. If your network does not have DHCP server, you will need to configure a static IP address.

Enter the IP address into your browser to display the authentication screen.
http://<*IP Address*> (e.g.: http://192.168.10.50)

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To access the Web UI, you have to enter a user name and password. The initial defaults for administrator login are:

- User name: admin
- Password: 1234

When the password has been verified, the home page is displayed.

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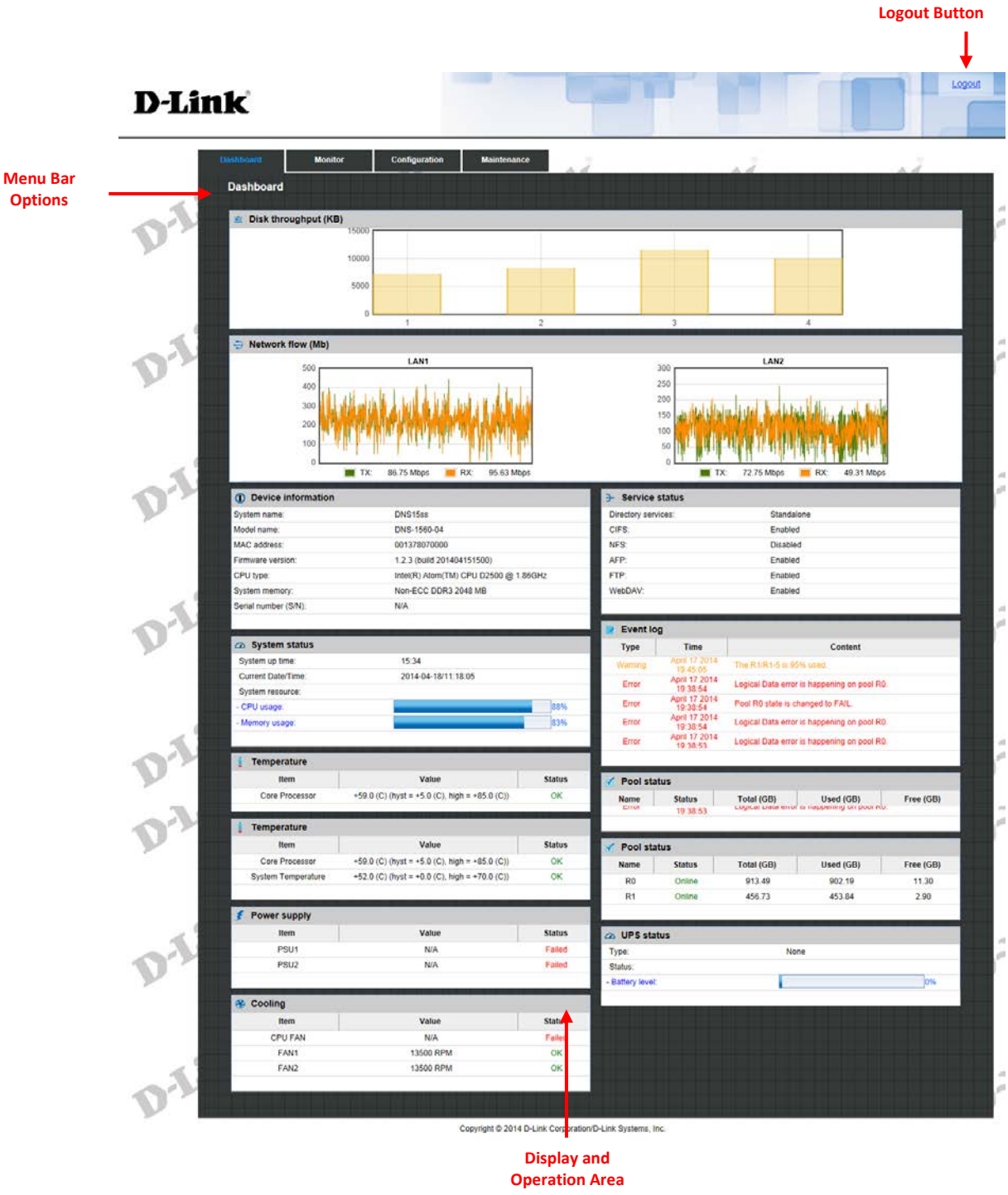

Choose the functions from the Menu Bar on the top side of the window to make any configuration changes.

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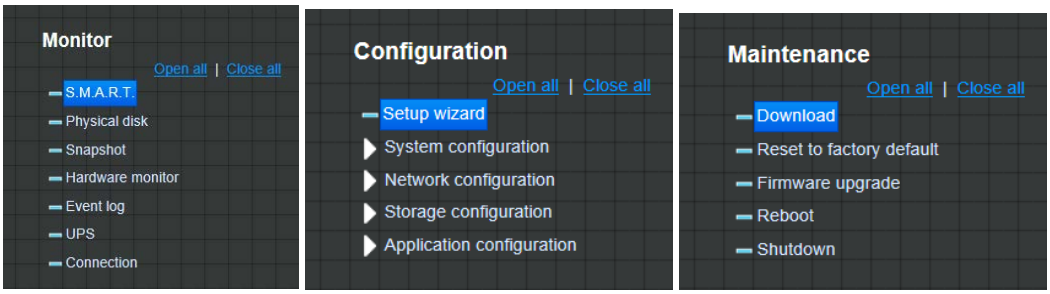


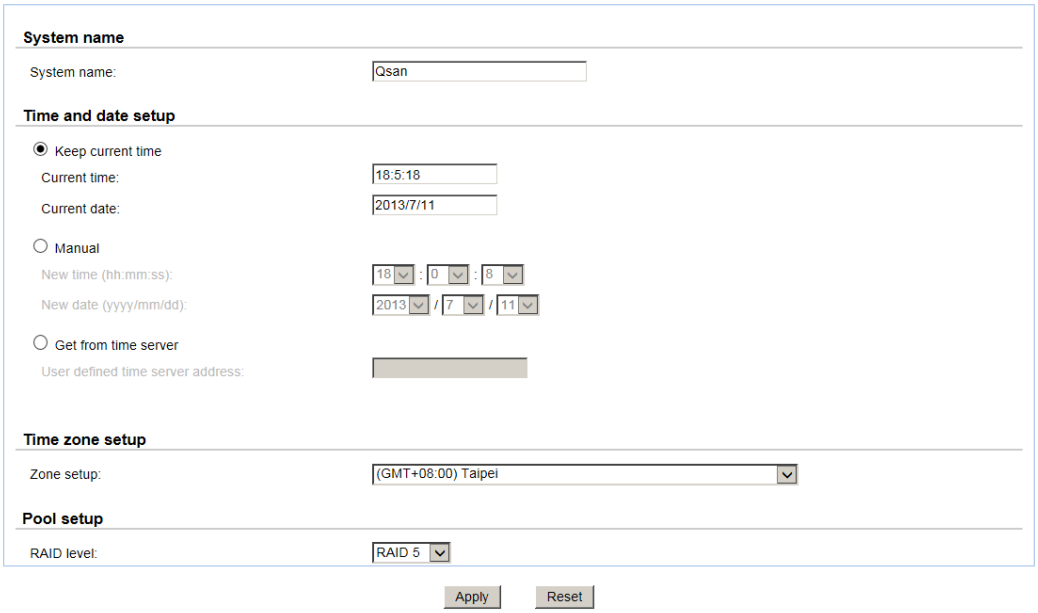
How to Use the Guided Configurations

To help users get started quickly, a guided configuration tool is available in the Web UI. The **Setup wizard** guides you an easy way to create a volume. If you are an advanced user, you can skip this step.

Setup Wizard Tool

This tool guides you through the process of setting up basic array information, configuring network settings, and the creation of a pool on the storage system. Please make sure that the system has some free hard drives installed on it. The following is the procedure.

1. Click **Configuration** / **Setup wizard**.
2. Enter a **System name** and set up the **Time and date** if necessary. Choose the **Time zone** and RAID level of pool, then click the **Apply** button to proceed.



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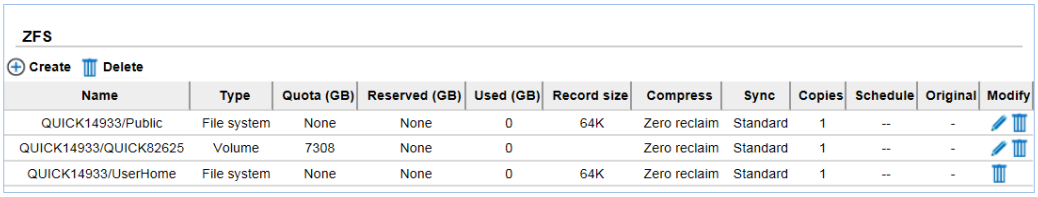
3. The file systems and volumes are created and named by the system automatically. The system is also created for sharing usage. It is now available to use.



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Basic Configuration

Interface Hierarchy

This table describes the hierarchy of the Web GUI.

Menu Bar	L1	L2, Button or Menu
Dashboard	Disk throughput	
	Network flow (Mb)	
	Device information	
	System status	
	Temperature	
	Power supply	
	Cooling	
	Service status	Directory services / CIFS / NFS / ARP / FTP / WebDAV
	Event log	
	Pool status	
Monitor Monitor	S.M.A.R.T	
	Physical disk	
	Snapshot	Filter
	Hardware monitor	
	Event log	Clear / Download / Filter
	UPS	
	Connection	
Configuration	Setup wizard	
	System Configuration	System / Time / Account / Mail Setting / Messenger / SNMP / System Log Server / UPS
	Network Configuration	Network Settings / DNS Settings
	Storage Configuration	Physical Disk / Pool / ZFS / Share / LUN / SnapShot
	Application Configuration	Directory Servers / CIFS / NFS / AFP / FTP / WebDAV / ISCSI / Backup / Antivirus
Maintenance	Download	Download
	Reset to Factory Default	Reset device
	Firmware Upgrade	Upgrade
	Reboot	Reboot
	Shutdown	Shutdown

Dashboard

The **Dashboard** menu option displays a whole picture of the system. The tables include **Disk throughput, Network flow, Device information, System status, Temperature, Power supply, Cooling, Service status, Event log**, and **Pool status**.

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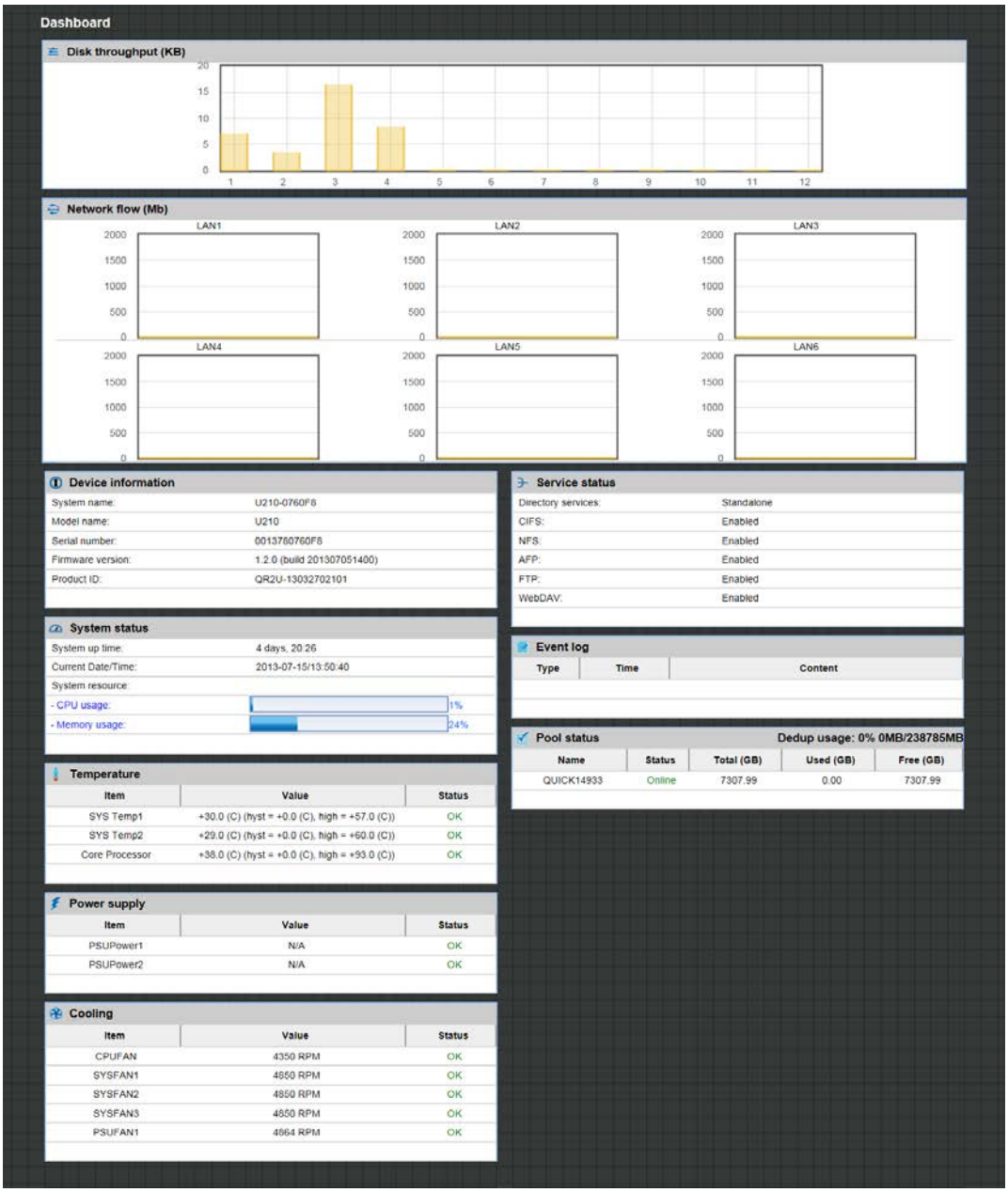

Monitor

The **Monitor** menu option is for accessing the **S.M.A.R.T., Physical disk, Snapshot, Hardware monitor, Event log, UPS**, and **Connection** options.

S.M.A.R.T.

S.M.A.R.T. (Self-Monitoring Analysis and Reporting Technology) is a diagnostic tool for hard drives to deliver warning of drive failures in advance. The **S.M.A.R.T.** option provides users a chance to take actions before a possible drive failure.

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S.M.A.R.T.

Slot No.	HDD type	Read error rate	Spin up time	Reallocated sector count	Seek error rate	Spin up retries	Calibration retries	Temperature (°C)
1	SATA 3.0 Gbit	200(51)	167(21)	200(140)	200(0)	100(0)	100(0)	35(0/55)
2	SATA 3.0 Gbit	200(51)	165(21)	200(140)	200(0)	100(0)	100(0)	34(0/55)
3	SATA 3.0 Gbit	200(51)	165(21)	200(140)	200(0)	100(0)	100(0)	33(0/55)
4	SATA 3.0 Gbit	200(51)	172(21)	200(140)	200(0)	100(0)	100(0)	32(0/55)

S.M.A.R.T. measures many attributes of the hard drive all the time and inspects the properties of hard drives which are close to be out of tolerance. The advanced notice of possible hard drive failure gives users precautions to back up hard drive or replace the hard drive. This is much better than hard drive crash when it is writing data or rebuilding a failed hard drive.

The numbers displayed are real-time value. The number in parenthesis is the threshold value. The threshold values from different hard drive vendors are different; please refer to hard drive vendors' specification for details.

S.M.A.R.T. only supports SATA drives. SAS drives do not have this function and will show N/A in the web page.

Physical disk

The **Physical disk** option gives you the hard drive status.

Physical disk

Slot No.	Size (GB)	Pool name	Status	Health	SMARTCTL	Usage	SSD	Vendor	Serial	Rate
1	1863	QUICK14933	Online	Good	Unknown	RAID disk	No	WDC	WD-WCAVY3970619	SATA 3.0 Gbit
2	1863	QUICK14933	Online	Good	Unknown	RAID disk	No	WDC	WD-WCAVY4168734	SATA 3.0 Gbit
3	1863	QUICK14933	Online	Good	Unknown	RAID disk	No	WDC	WD-WCAVY4137753	SATA 3.0 Gbit
4	1863	QUICK14933	Online	Good	Unknown	RAID disk	No	WDC	WD-WCAVY4118479	SATA 3.0 Gbit

This table shows the column descriptions.

Column Name	Description
Slot No.	The position of a hard drive.
Size (GB)	Capacity of hard drive.
Pool Name	Pool name.
Status	The status of the hard drive: • Online: the hard drive is online. • Rebuilding: the hard drive is being rebuilt. • Degraded: one of the RAID set is at degraded mode. • Failed: one of the RAID set is at failed mode. • Importing: the system is loading data from the disks, which means the pool is not ready for use yet.
Health	The health of the hard drive: • Good: the hard drive is good.

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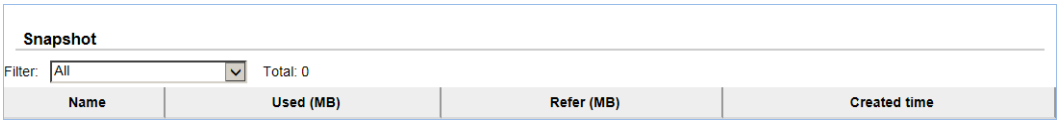
	• Failed: the hard drive is failed. • Error alert: S.M.A.R.T. error alert. • Read errors: the hard drive has unrecoverable read errors. • Reserved: the disk is one of the member disks of a RAID group. It contains RAID group and pool information, but the original RAID group and pool can't be found. Either you put this disk in its original slot or set this disk as a free disk.
SMARTCTL	The SMART of the hard drive: • Unknown: the SMART of the hard drive is unknown. • NoError: the SMART of the hard drive has no errors. • HasError: the SMART of the hard drive has an error.
Usage	The usage of the hard drive: • RAID disk: This hard drive has been set to a RAID group. • Free disk: This hard drive is free for use. • Dedicated spare: This hard drive has been set as the dedicated spare of a pool.
SSD	HDD or SSD.
Vendor	Hard drive vendor.
Serial	Hard drive serial number.
Rate	Hard drive rate: • SAS 6Gb/s. • SAS 3Gb/s. • SATA 6Gb/s. • SATA 3Gb/s. • SATA 1.5Gb/s.

Snapshot

The **Snapshot** option gives you the status of the snapshot file system or volume.



This table shows the column descriptions.

Column Name	Description
Name	The snapshot name.
Used (MB)	The amount of snapshot space that has been used.
Refer (GB)	The refer capacity of the file system or volume.
Created time	The time that the snapshot is created.

The function is available in this tab:

- **Filter:** Drop down menu to select the file system or volume.

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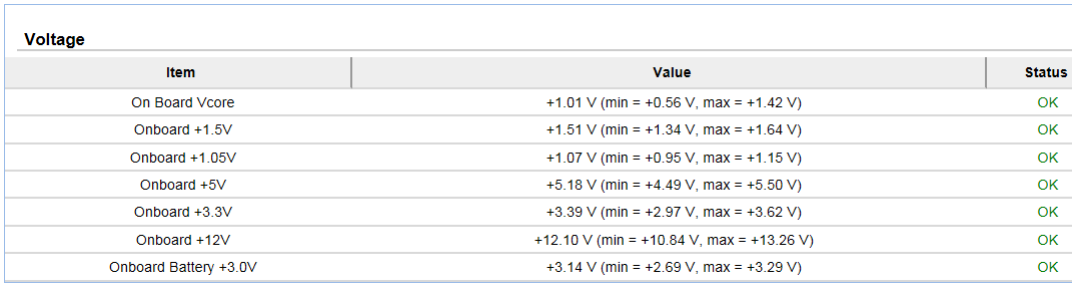
Hardware monitor

The **Hardware monitor** option provides the status of system voltage, temperature, power supply, and cooling. The following example shows voltage.



Voltage

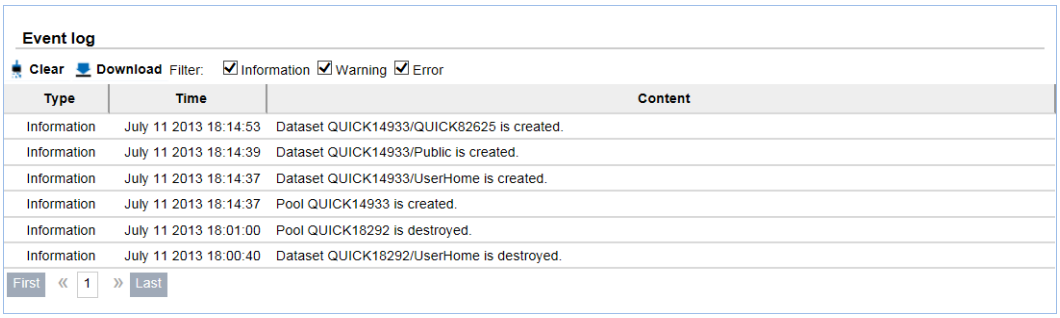
Item	Value	Status
On Board Vcore	+1.01 V (min = +0.56 V, max = +1.42 V)	OK
Onboard +1.5V	+1.51 V (min = +1.34 V, max = +1.64 V)	OK
Onboard +1.05V	+1.07 V (min = +0.95 V, max = +1.15 V)	OK
Onboard +5V	+5.18 V (min = +4.49 V, max = +5.50 V)	OK
Onboard +3.3V	+3.39 V (min = +2.97 V, max = +3.62 V)	OK
Onboard +12V	+12.10 V (min = +10.84 V, max = +13.26 V)	OK
Onboard Battery +3.0V	+3.14 V (min = +2.69 V, max = +3.29 V)	OK

This table shows the column descriptions.

Column Name	Description
Item	The item name.
Value	The value of the item and its criteria.
Status	OK or Fail.

Event log

The **Event log** option provides a log for event messages. In filter the section, check INFO, WARNING, or ERROR to display these particular events.



Event log

Clear Download Filter: Information Warning Error

Type	Time	Content
Information	July 11 2013 18:14:53	Dataset QUICK14933/QUICK82625 is created.
Information	July 11 2013 18:14:39	Dataset QUICK14933/Public is created.
Information	July 11 2013 18:14:37	Dataset QUICK14933/UserHome is created.
Information	July 11 2013 18:14:37	Pool QUICK14933 is created.
Information	July 11 2013 18:01:00	Pool QUICK18292 is destroyed.
Information	July 11 2013 18:00:40	Dataset QUICK18292/UserHome is destroyed.

First « 1 » Last

The options are available on this tab:

- **Clear:** Click **Clear** button to clear all event logs.
- **Download:** Click **Download** button to save the whole event log as a text file with file name "LOG-SystemName-Date-Time.log".

The event log is displayed in reverse order which means the latest event log is on the first / top page. When the UserHome directory exists, the system will store event log content in the storage pool where the UserHome directory belongs. Deleting the UserHome pool will result in deleting

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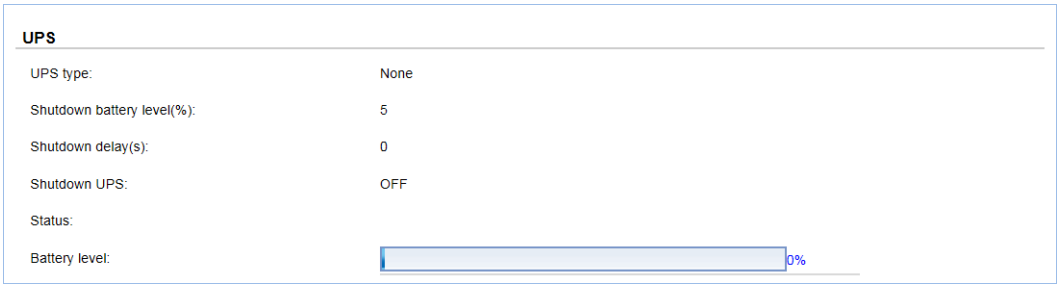
event log content. Re-assigning the UserHome directory to a different storage pool will wipe the event log content out as well.

UPS

The **UPS** option provides the status of the UPS (Uninterruptible Power Supply).



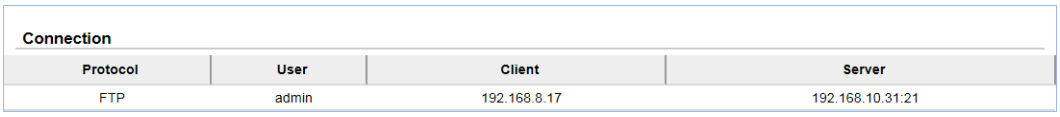
This table shows the available options and their descriptions.

Column Name	Description
UPS Type	UPS Type: • None: No UPS or other vendors. • Smart-UPS: APC UPS.
Shutdown battery level (%)	When below the setting level, the system will shutdown. “0” is disabled UPS.
Shutdown delay (s)	If power failure occurs and system power cannot recover after the time setting, the system will shutdown. “0” is disabled the function.
Shutdown UPS	The status of shutdown UPS: UPS Type: • ON: When power is gone, UPS will shutdown by itself after the system shuts down successfully. After the power comes back, UPS will start working and notify system to boot up. • OFF: Will not.
Battery level (%)	Current power percentage of battery level.

The system will shutdown if either **Shutdown battery level (%)** or **Shutdown delay (s)** reaches the condition. User should set these values carefully.

Connection

The **Connection** option displays all the connection information for the system.



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This table shows the available options and their descriptions.

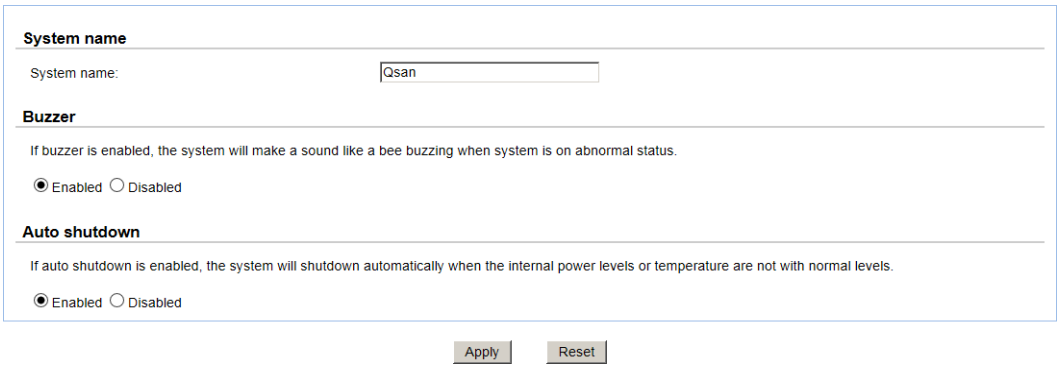
Column Name	Description
Protocol	The protocol type of the connection.
User	The connection user.
Client	The client information of the connection.
Server	The server information of the connection.

System Configuration

The **System configuration** menu option is for accessing the **System**, **Time**, **Account, Mail setting**, **Messenger, SNMP, System log server**, and **UPS** options.

System

The **System** option is used to setup the system name, system indication, buzzer and auto shutdown. The default system name is composed of the model name and the serial number of this system.


System name
System name:
Qsan
Buzzer
If buzzer is enabled, the system will make a sound like a bee buzzing when system is on abnormal status.
Enabled
Disabled
Auto shutdown
If auto shutdown is enabled, the system will shutdown automatically when the internal power levels or temperature are not with normal levels.
Enabled
Disabled
Apply
Reset

The options that are available in this tab:

- **System name:** To change the **System name**, highlight the old name and type in a new one.
- **Buzzer:** If the buzzer is enabled, the system will make a sound like a bee buzzing when on abnormal status.
- **Auto shutdown:** Enable this to let the system shutdown automatically when the voltage or temperature is out of the normal range. For better data protection, it is recommended to check **Auto Shutdown**.

When it is done, click the **Apply** button.

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Time

The **Time** option is used to setup the system time and NTP (Network Time Protocol) server setting.

The options available in this tab are:

- **Time and Date Setup:** Changes the current date, time or time server. Enter the IP address to synchronize the time from a time server.
- **Time Zone Setup:** Changes time zone settings.

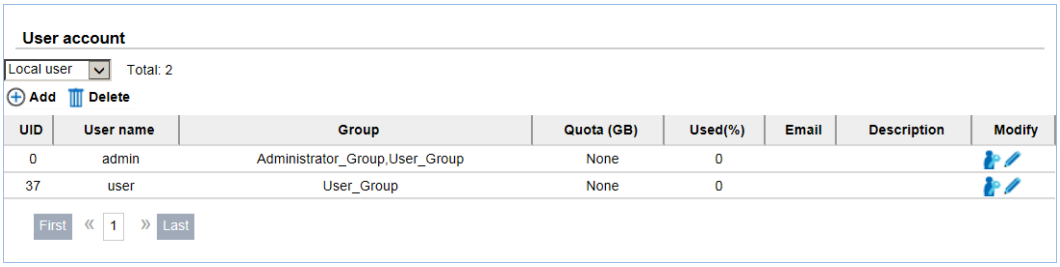
When it is done, click **Apply** button.

Account

The **Account** option is used to setup users and groups in the system. It is for accessing the **User account**, **Group account**, and **Import/Export account** option tabs.

The **User account** tab provides a function to manage local user accounts such as add, delete, edit, change password or view the status of the users. Local user accounts and domain user accounts are displayed separately by selecting the drop down list.

Domain user accounts are only for display purpose. You cannot edit domain account or change the password of domain account.



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This table shows the column descriptions.

Column Name	Description
UID	The user ID.
User name	The account name.
Group	The user belongs to the groups.
Quota (GB)	User quota space.
Used (%)	The percentage of the quota usage.
Email	User's email.
Description	User's description.

The functions are available in this tab:

- **Add User:** Create a user.
- **Delete:** Delete the user.
- **Change password:** Change the user's password.
- **Edit:** Edit the user.

Please be aware that before you can create local accounts, a storage pool with a home directory function enabled must be created first. Otherwise, you will not be able to create local account and all functions will be unselectable. For each local account created, the system will automatically create a personal folder in the home directory with the capacity limit specified in account creation. The user can access his/her home directory right away.

Take an example of creating an account.

1. Click the **Add User** button.

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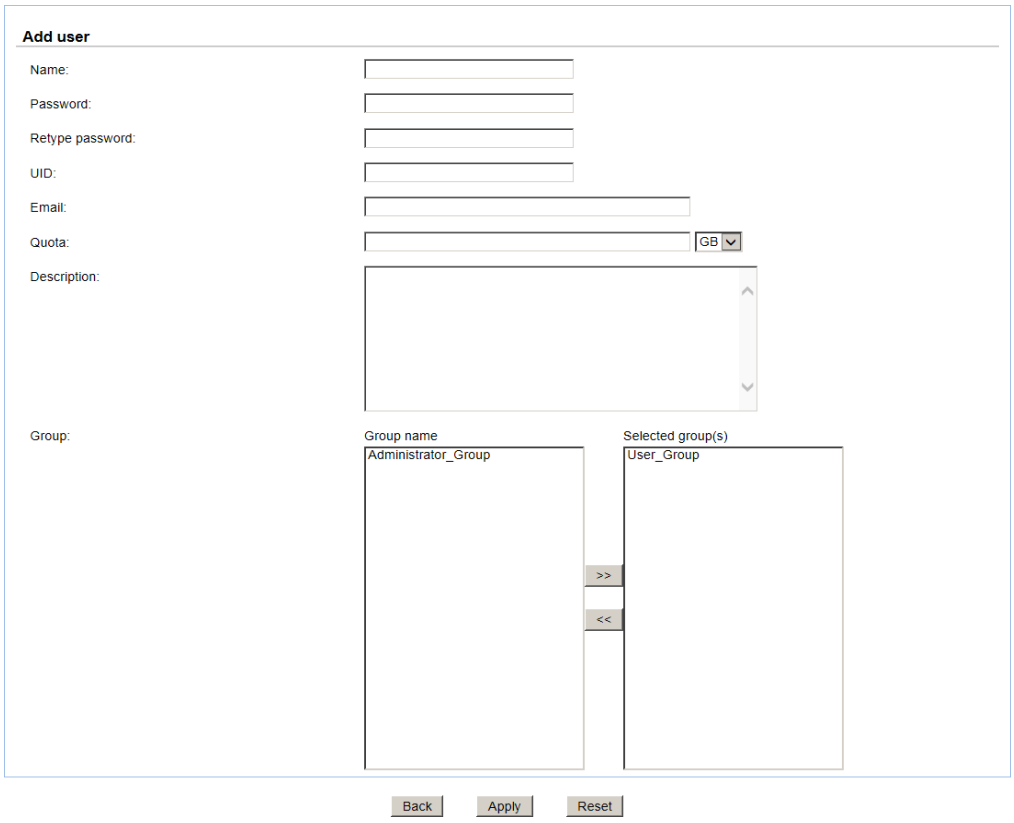

2. Enter the **Name**, **Password**, and **Retype password**. The other fields are optional.
3. Click **Apply** button to create an account.

UID is open for user assignment. If UID input is left blank, the system will assign an ID automatically. User-assigned ID has a range 1000 ~ 60000.

TIP:
The password is required to be at least 12 and up to 16 alphanumeric characters. This is because of UnifiedAUTH mechanism that will integrate with iSCSI CHAP account. iSCSI CHAP account requires that the password needs to be 12 to 16 characters.

If the system is using Active Directory or LDAP as directory service, you may see the domain users as below. Please be aware that no modification (add, delete, edit, change password) can be made to domain users. This can only be done on the AD server or LDAP server.
The syntax to represent a domain user is :
<domain name>+<user account>

The menu **Group account** tab provides the function to manage local groups such as add, delete, edit, or view the status of the groups. Local groups and domain groups are displayed separately by selecting the drop down list.

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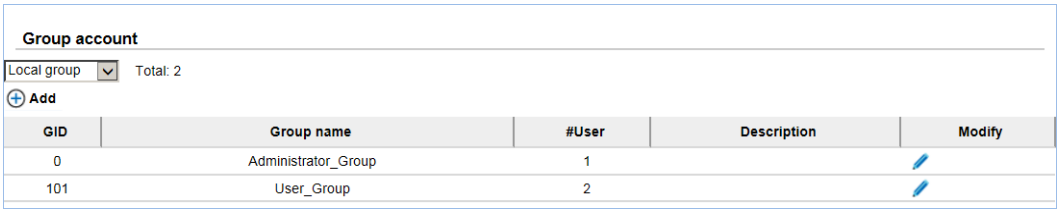


This table shows the column descriptions.

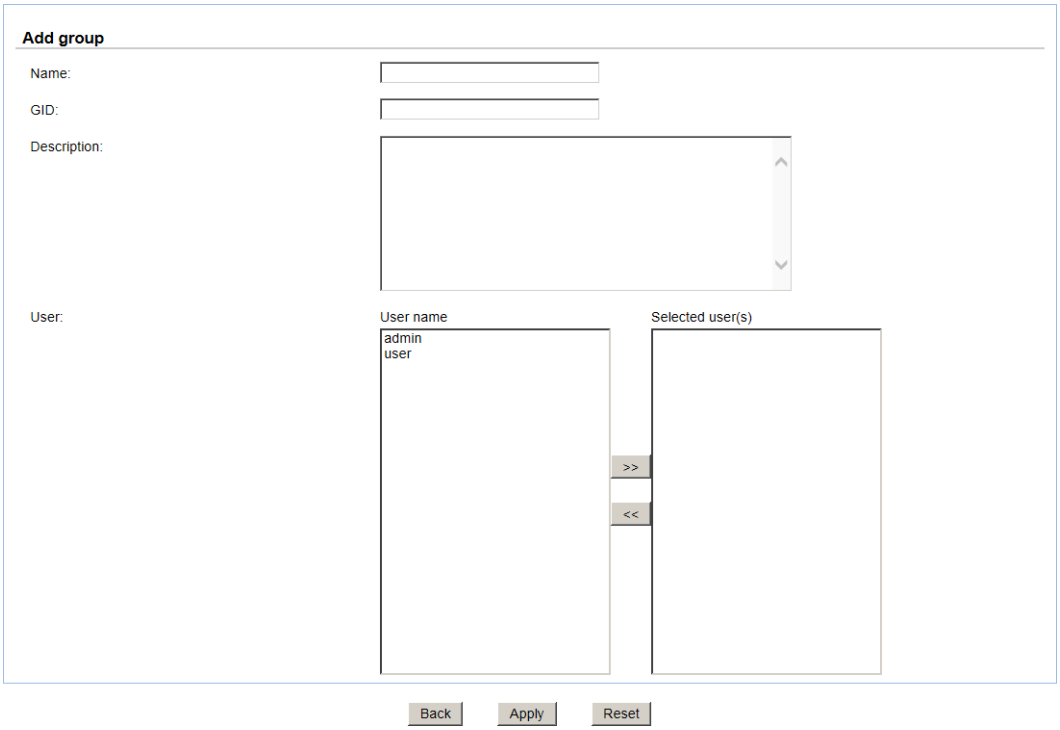
Column Name	Description
GID	Group ID (user assigned range 1000 ~ 60000).
Group name	The group name.
#User	The number of users that belong to this group.
Description	Group's description.

Functions in the right click menu:

- **Add Group:** Create a group.
- **Edit:** Edit the group.
- **Delete:** Delete the group.

Take an example of creating a group.

1. Click **Add Group** button.



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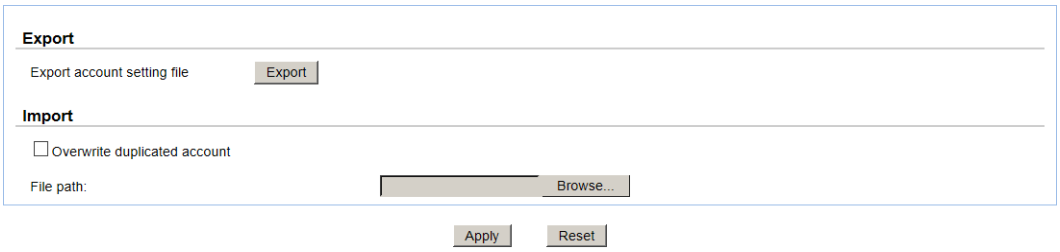
2. Enter the **Name** field. The other fields are optional.
3. Click the **Apply** button to create a group.

GID is open for user assignment. If GID input is left blank, the system will assign an ID automatically. User-assigned ID has a range 1000 ~ 60000.

If the system is using Active Directory or LDAP as directory service, you may see the domain groups as below. Please be aware that no modification (add, delete, edit) can be made to domain groups. This can only be done on the AD server or LDAP server.
The syntax to represent a domain user is:

<Domain name>+<group name>

The menu **Import/Export account** tab provides the function to import/export accounts.



The options available on this tab are:

- **Export:** Export all users and groups to a file.
- **Overwrite duplicated account:** Check this to overwrite duplicated accounts.
- **Import:** Import all users and groups from a file.

The import/export file is a pure text file with the following format. Each attribute is separated by a colon. For group account between two colons, each user is separated by a comma. Before importing account file, you may create several accounts and export the account file first to get familiar with the format.

[Users]
user name:user password:quota:UID:email:desc
[Groups]
group name:user1,user2...:GID:desc

Please be aware that the actual password will not be exported. In an exported file, the password will be replaced with a dummy password 1234. When the same account name (case sensitive) exists during importing, it will not overwrite the existing account information unless “overwrite

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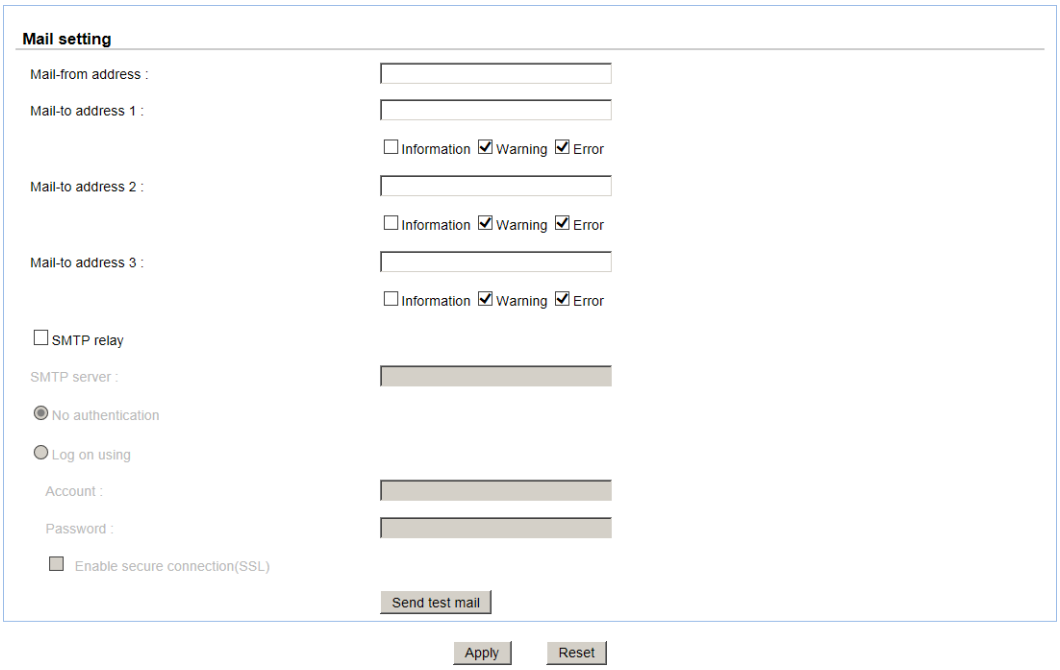
duplicated account" is checked. When overwriting a user account, UID remains unchanged. When overwriting a group account, GID remains unchanged and the original group members remain plus any newly added group members.

Mail Setting

The **Mail setting** option is used to enter up to three mail addresses for receiving event notifications. Fill in the necessary fields and click **Send test mail** to test whether it is working. Some mail servers check the **Mail-from address** and need the SMTP relay setting for authentication.

TIP:
Please make sure the DNS server IP is well-setup in **Network configuration -> DNS Setting**. So the event notification mails can be sent successfully.

You can also select which levels of event logs you would like to receive. The default setting only includes WARNING and ERROR event logs.



When it is done, click **Apply** button.

Messenger

The **Messenger** option is used to setup pop-up messages via Windows messenger (not MSN).

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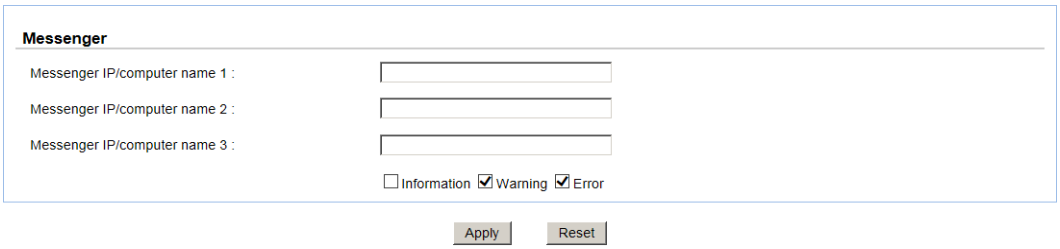


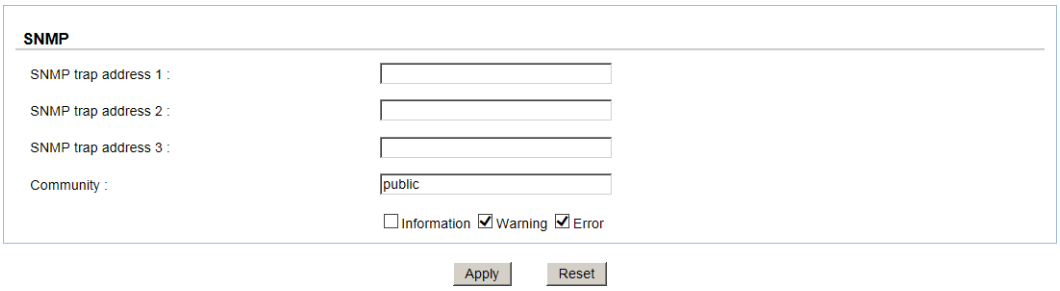
The options are available in this tab:

- **Messenger:** You must enable the Messenger service in Windows (**Start -> Control Panel -> Administrative Tools -> Services -> Messenger**). It allows up to three Messenger addresses. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs.

When it is done, click the **Apply** button.

SNMP

The **SNMP** option is used to setup SNMP traps (for alerting via SNMP).



The options are available in this tab:

- **SNMP trap address:** It allows up to three SNMP trap addresses. The default community setting is public. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs.

  There are many SNMP tools available on the internet.

  - SNMPc: http://www.snmpc.com/
  - Net-SNMP: http://net-snmp.sourceforge.net/

When it is done, click **Apply** button.

System Log Server

The **System log server** option is used to setup alerts via the syslog protocol.

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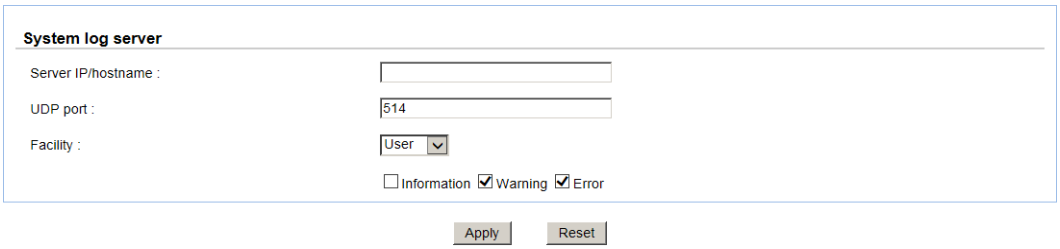


The options are available in this tab:

- **Server IP/hostname:** Fill in the necessary fields for syslog service. The default port is 514. You can choose the alert levels which you would like to receive. The default setting only includes WARNING and ERROR event logs.

  There are some syslog server tools available on the internet for Windows.

  - WinSyslog: http://www.winsyslog.com/
  - Kiwi Syslog Daemon: http://www.kiwisyslog.com/

  Most UNIX systems have a built-in syslog daemon.

When it is done, click **Apply** button.

Network Configuration

The **Network configuration** menu option is for accessing the **Network Setting**, and **DNS Setting** options.

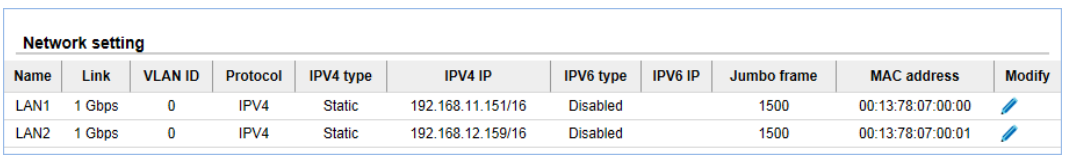
Network Setting

The **Network setting** option is for accessing the **Management** network port and **LAN** ports. It is used to change the IP addresses of network ports.

DNS-1560-04:

- 1 x GbE Management port + 1 x GbE port.

Each port must be assigned its own IP address.



Network setting

Name	Link	VLAN ID	Protocol	IPV4 type	IPV4 IP	IPV6 type	IPV6 IP	Jumbo frame	MAC address	Modify
LAN1	1 Gbps	0	IPV4	Static	192.168.11.151/16	Disabled		1500	00:13:78:07:00:00	
LAN2	1 Gbps	0	IPV4	Static	192.168.12.159/16	Disabled		1500	00:13:78:07:00:01	

The following table describes the relationship with the service and the network ports.

This table shows the column descriptions.

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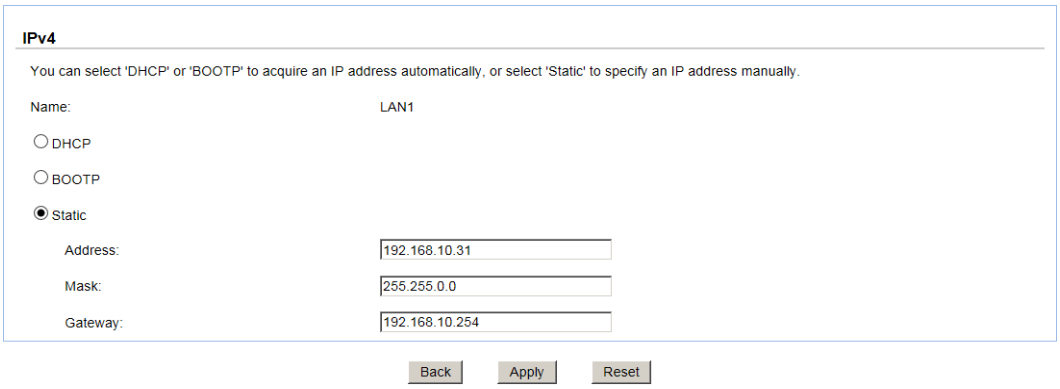
Column Name	Description
Name	Port name.
Ling	Link up or down.
VLAN ID	VLAN number.
Protocol	Use IPv4 or IPv6.
IPV4 Type	IPv4 address mode: • Static: static address. • DHCP: DHCP assigned address.
IPV4 IP	IPv4 address.
IPV6 Type	IPv6 address mode: • Static: static address. • Auto: RA (router advertisement) calculated address. • DHCP: DHCPv6 assigned address.
IPv6 IP	IPv6 address.
Jumbo frame	Jumbo frame size
MAC Address	MAC address

The functions are available in this tab:

- **Edit:** Set IPv4 address, IPv6 address, VLAN ID, Default gateway and Jumbo frame.

The options are available on **Edit** icon:

- **IPv4:** There are three options: **DHCP**, **BOOTP** or specify a **Static** IP address. The default setting is DHCP. If the network environment does not have DHCP server, the IP address will fallback to zero config.



- **IPv6:** There are three options: **Automatic**, **DHCP**, or **Static** for specifying IPv6 address. The default is **Automatic**.

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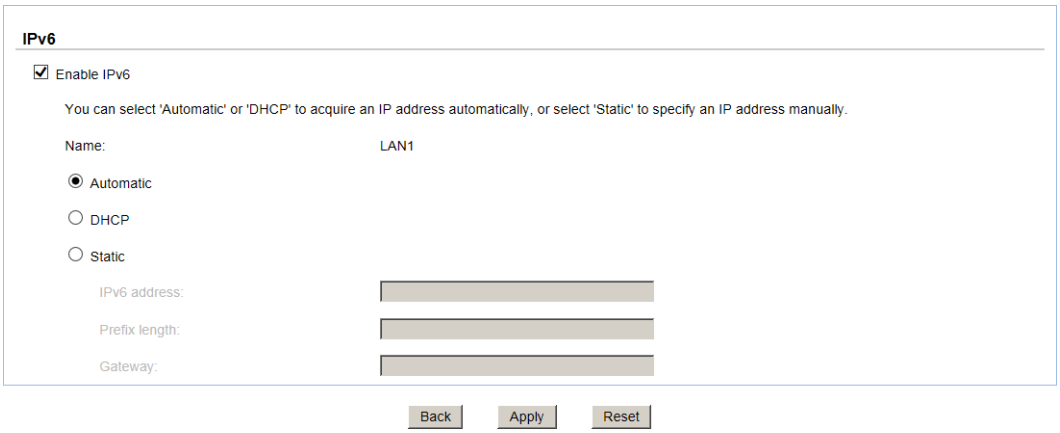
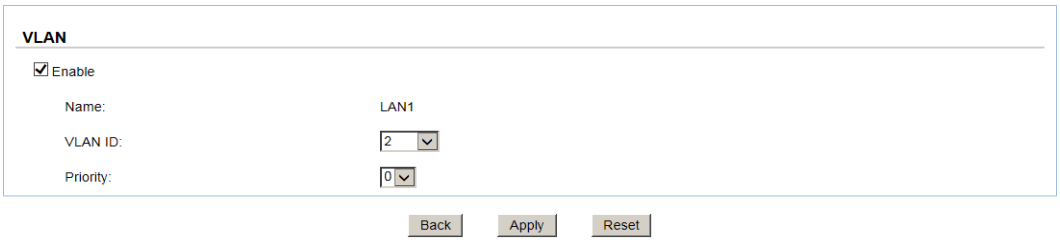
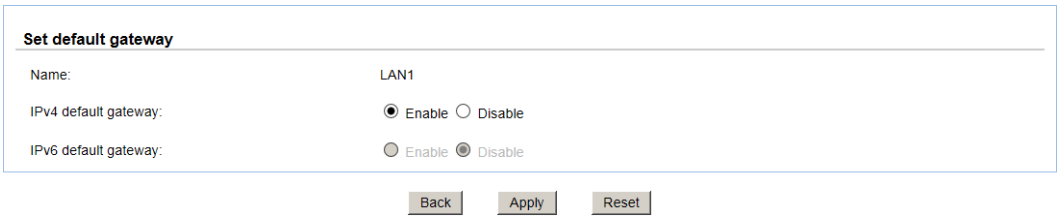


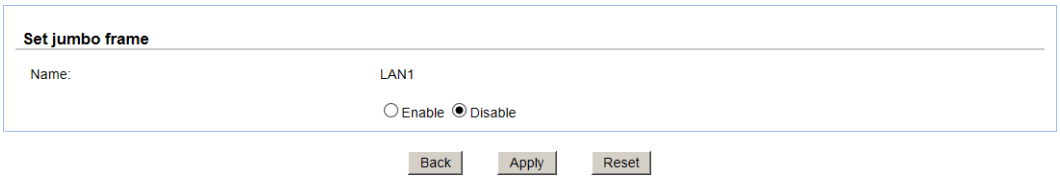
- **VLAN ID:** Setup VLAN ID and priority if necessary.



- **Default gateway:** Enable or disable the port as default gateway.



- **Jumbo frame:** Enable or disable jumbo frame on the port.



DNS Setting

The **DNS setting** option is for accessing the **DNS (Domain Name Service) setting**. It is used to change DNS IP addresses.

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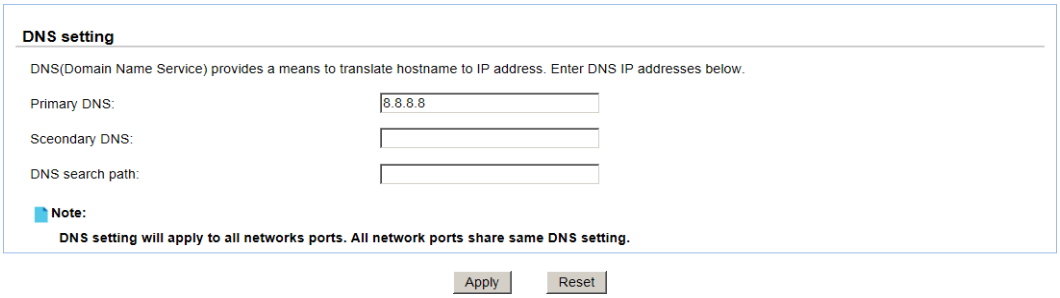

DNS setting
DNS(Domain Name Service) provides a means to translate hostname to IP address. Enter DNS IP addresses below.
Primary DNS:
8.8.8.8
Sceondary DNS:
DNS search path:
Note:
DNS setting will apply to all networks ports. All network ports share same DNS setting.
Apply
Reset

The options are available on this tab:

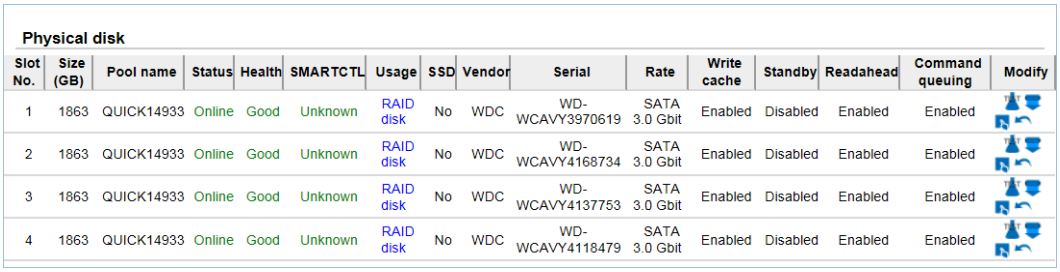
- **Primary DNS:** The IP address of DNS server can be entered or changed here. The DNS settings will be applied to all network ports, which mean you ONLY need to select one of the network ports and start DNS setting.
- **Secondary DNS:** Optional.
- **DNS search path:** It is a list of domains to try when the system tries to translate a machine name into an IP address. It provides more flexibility than the simple domain statement.

Storage Configuration

The **Storage configuration** menu option is for accessing the **Physical disk**, **Pool**, **ZFS**, **Share, LUN**, and **Snapshot** options.

Physical Disk

The **Physical disk** option gives you the hard drive status.


Physical disk
Slot No. | Size (GB) | Pool name | Status | Health | SMARTCTL | Usage | SSD | Vendor | Serial | Rate | Write cache | Standby | Readahead | Command queuing | Modify
1 | 1863 | QUICK14933 | Online | Good | Unknown | RAID disk | No | WDC | WD-WCAVY3970619 | SATA 3.0 Gbit | Enabled | Disabled | Enabled | Enabled
2 | 1863 | QUICK14933 | Online | Good | Unknown | RAID disk | No | WDC | WD-WCAVY4168734 | SATA 3.0 Gbit | Enabled | Disabled | Enabled | Enabled
3 | 1863 | QUICK14933 | Online | Good | Unknown | RAID disk | No | WDC | WD-WCAVY4137753 | SATA 3.0 Gbit | Enabled | Disabled | Enabled | Enabled
4 | 1863 | QUICK14933 | Online | Good | Unknown | RAID disk | No | WDC | WD-WCAVY4118479 | SATA 3.0 Gbit | Enabled | Disabled | Enabled | Enabled

This table shows the column descriptions.

Column Name	Description
Slot No.	The position of a hard drive.
Size (GB)	Capacity of hard drive.
Pool Name	Pool name.
Status	The status of the hard drive:

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	• Online: the hard drive is online. • Rebuilding: the hard drive is being rebuilt. • Degraded: one of the RAID set is at degraded mode. • Failed: one of the RAID set is at failed mode. • Importing: the system is loading data from the disks, which means the pool is not ready for use yet.
Health	The health of the hard drive: • Good: the hard drive is good. • Failed: the hard drive has failed. • Error alert: S.M.A.R.T. error alert. • Read errors: the hard drive has unrecoverable read errors. • Reserved: the disk is one of the member disks of a RAID group. It contains RAID group and pool information, but the original RAID group and pool can't be found. Either you put this disk at its original slot or set this disk as a free disk.
SMARTCTL	The SMART of the hard drive: • Unknown: the SMART of the hard drive is unknown. • NoError: the SMART of the hard drive has no error. • HasError: the SMART of the hard drive has error.
Usage	The usage of the hard drive: • RAID disk: This hard drive has been set to a RAID group. • Free disk: This hard drive is free for use. • Dedicated spare: This hard drive has been set as dedicated spare of a pool.
SSD	HDD or SSD.
Vendor	Hard drive vendor.
Serial	Hard drive serial number.
Rate	Hard drive rate: • SAS 6Gb/s. • SAS 3Gb/s. • SATA 6Gb/s. • SATA 3Gb/s. • SATA 1.5Gb/s.
Write cache	Hard drive write cache is enabled or disabled. The default value is Enabled.
Standby	HDD auto spindown to save power. The default value is Disabled.
Readahead	This feature makes data be loaded to disk's buffer in advance for further use. The default value is Enabled.
Command queuing	Newer SATA and most SCSI disks can queue multiple commands and handle one by one. The default value is Enabled.

The functions are available in this tab:

- **SMARTCTL self-test running:** Active or inactive SMART self-test.
- **Download SMARTCTL log:** Download SMART self-test log.
- **Set free disk:** Make the hard drive free for use.
- **Disk replace:** Replace the hard drive of the pool to another free hard drive.

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Pool

The **Pool** option provides various functions to manage storage pool such as create, expand, and set home directory, delete, or view the status of the pools.

This table shows the column descriptions.

Column Name	Description
Name	Pool name.
Total (GB)	Total capacity of this pool.
Used (GB)	Used capacity of this pool.
Free (GB)	Free capacity of this pool.
Capacity	The percentage or the capacity.
Status	The status of the pool: • Online: the pool is good. • Failed: the pool fails. • Rebuild: the pool is being rebuilt.
Home	The home directory is in the pool or not.
RAID set slot	The physical disk slots of the RAID set.
Spare slot	The spare physical disk slot.
Read cache slot	The SSD drives that are used as read cache (L2ARC).
Write cache slot	The SSD drives that are used as write cache (ZIL).

The functions are available in this tab:

- **Create:** Create a pool.
- **Import encrypt key:** Import the encrypt key file for security. (Not available in U110)
- **Edit:** Edit the pool settings.
- **Expand:** Add more RAID sets to the same pool to expand the capacity.
- **Scrub:** Perform pool scrubbing manually to make sure there is no defect in the hard drive.
- **Export encrypt key:** Export the encrypt key file. (This icon is shown when the pool is enabled the pool encrypt function.)
- **Delete:** Delete the pool. The pool can be deleted when there is no file system or volume in it.

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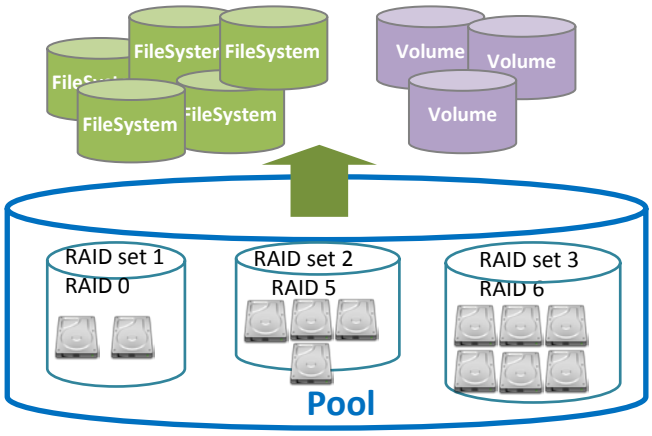
A storage pool can be made of up to 512 RAID sets, which can use different RAID levels. File systems for file sharing and volumes for iSCSI LUNs are created from the storage pool. Please check the following graph.



Take an example of creating a pool**.**

1. Click the **Create** icon.
2. Enter a **Pool Name**.
3. Use the drop-down list to select a **RAID level**.
4. Check the **Set up Home Directory** if the pool contains home directory.
5. Optionally, configure the following:
   - **Write Cache:** It's to enable or disable the write cache option of hard drives.
   - **Standby:** It's to enable or disable the auto spindown function of hard drives, when this option is enabled and hard drives have no I/O access after certain period of time, they will spin down automatically.
   - **Readahead:** It's to enable or disable the read ahead function.
   - **Command queuing:** It's to enable or disable the hard drives' command queue function.
6. Check Enable for **Pool encrypt** and enter the encrypt key if necessary. Check **Auto unlock** will unlock the pool upon the next reboot. Otherwise, it cannot be used except entering the encrypt key on every reboot.
7. Select disks from below, and then click **Next** button.

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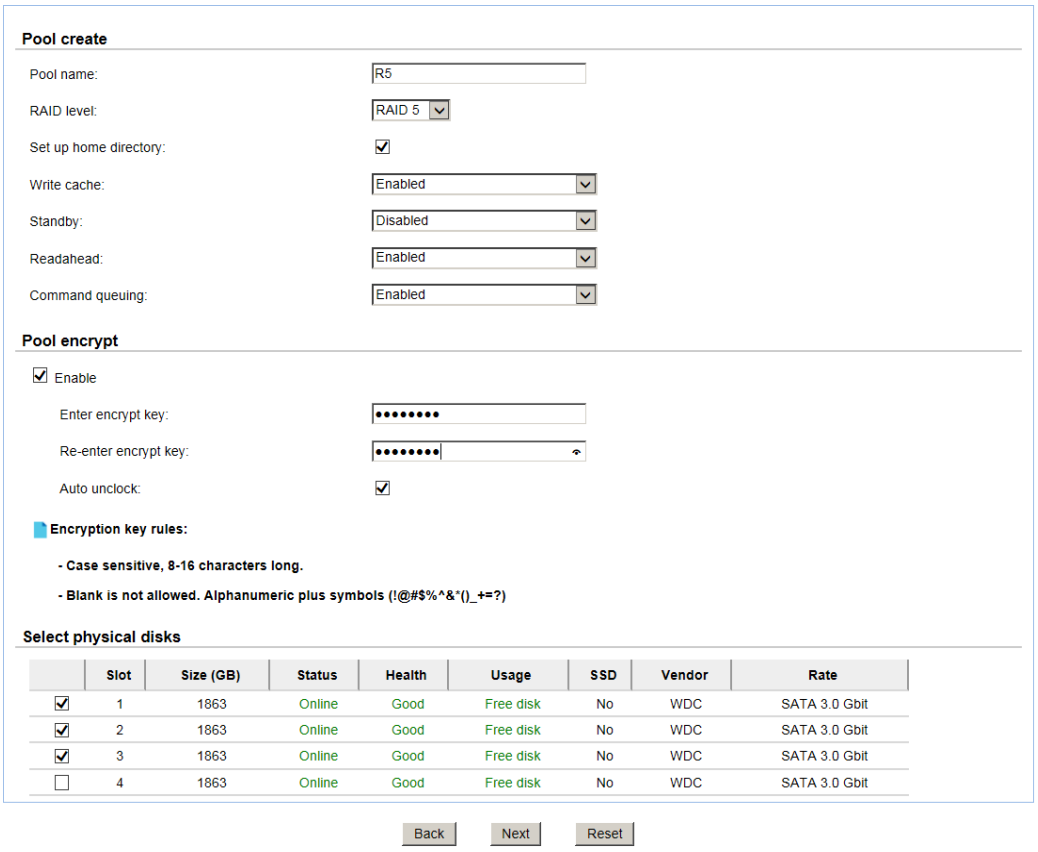
Pool create
Pool name: R5
RAID level: RAID 5
Set up home directory:
Write cache: Enabled
Standby: Disabled
Readahead: Enabled
Command queuing: Enabled
Pool encrypt
Enable
Enter encrypt key:
Re-enter encrypt key:
Auto unclock:
Encryption key rules:
- Case sensitive, 8-16 characters long.
- Blank is not allowed. Alphanumeric plus symbols (!@#$%^&*()_+=?)
Select physical disks
Slot Size (GB) Status Health Usage SSD Vendor Rate
1 1863 Online Good Free disk No WDC SATA 3.0 Gbit
2 1863 Online Good Free disk No WDC SATA 3.0 Gbit
3 1863 Online Good Free disk No WDC SATA 3.0 Gbit
4 1863 Online Good Free disk No WDC SATA 3.0 Gbit
Back
Next
Reset

8. At the confirmation message, click **Apply** button.

Pool
Create
Import encrypt key
Name Total (GB) Used (GB) Free (GB) Capacity Status Home RAID set slot Spares slot Read cache slot Write cache slot Modify
R5 3650.43 0 3650.43 0% Online Yes RAID 5 (Local: 1,2,3)

Take an example of set the disk properties and dedicated spare disk.

1. Dedicated spare disk is applied to specific storage pool. Make sure you have free hard drives for this. Click **Edit** icon in Modify field.
2. Enable or disable the properties of write cache, standby, readahead, command queuing.
3. Select the free disk you want to use as dedicated spare disk for this pool.
4. Click **Apply** button.

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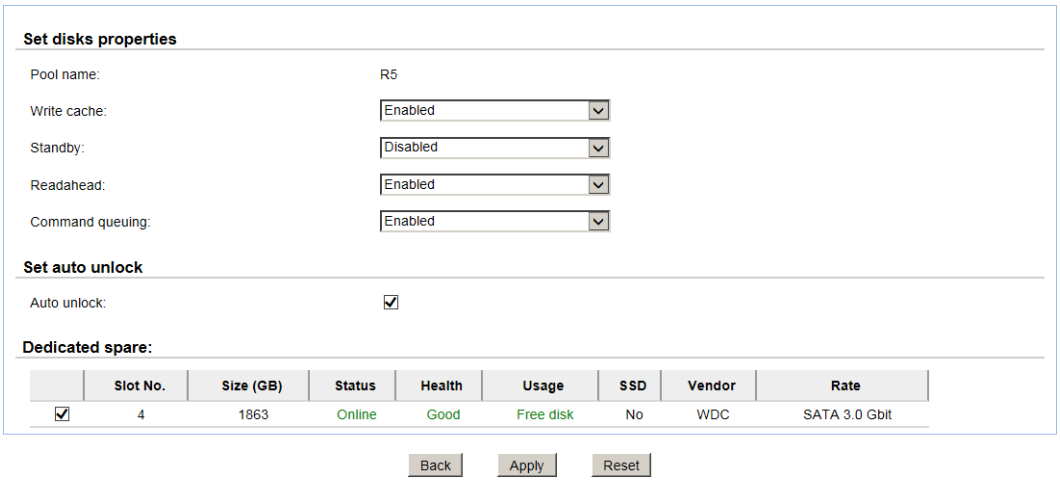
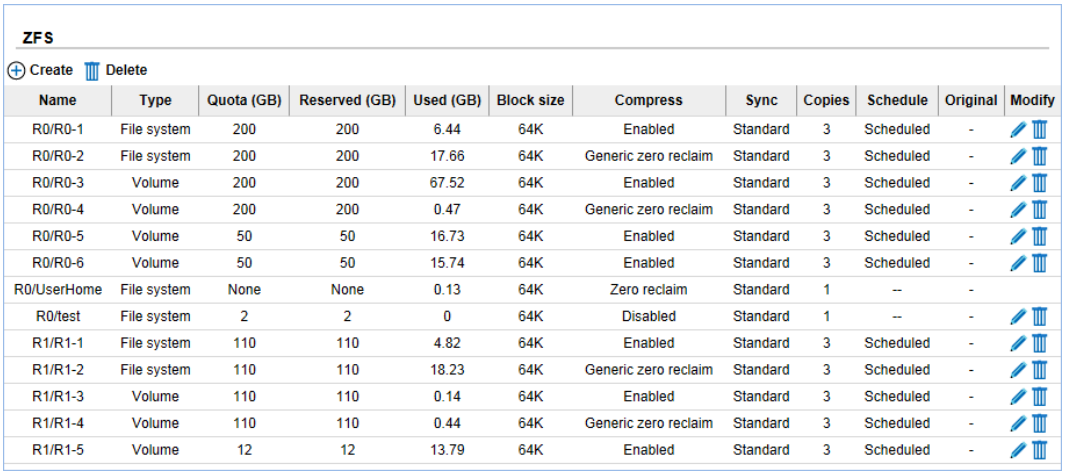


Take an example of expand the pool**.**

1. Make sure you have free hard drives for this. Click **Expand** icon in Modify field.
2. Pool name can't be changed since this is to expand the current pool, not creating a new pool. Select the RAID level and physical disks, and the click **Next** button.
3. At the confirmation message, click **Apply** button.
4. You may see that the capacity of Pool becomes larger. In the RAID set slot column, it shows the RAID set members of the pool.

ZFS

The **ZFS** option provides functions to manage ZFS datasets such as create, edit, delete, take snapshot, auto snapshot or view the status of the ZFS.


ZFS
Create
Delete
Name
Type
Quota (GB)
Reserved (GB)
Used (GB)
Block size
Compress
Sync
Copies
Schedule
Original
Modify
R0/R0-1 File system 200 200 6.44 64K Enabled Standard 3 Scheduled -
R0/R0-2 File system 200 200 17.66 64K Generic zero reclaim Standard 3 Scheduled -
R0/R0-3 Volume 200 200 67.52 64K Enabled Standard 3 Scheduled -
R0/R0-4 Volume 200 200 0.47 64K Generic zero reclaim Standard 3 Scheduled -
R0/R0-5 Volume 50 50 16.73 64K Enabled Standard 3 Scheduled -
R0/R0-6 Volume 50 50 15.74 64K Enabled Standard 3 Scheduled -
R0/UserHome File system None None 0.13 64K Zero reclaim Standard 1 -- -
R0/test File system 2 2 0 64K Disabled Standard 1 -- -
R1/R1-1 File system 110 110 4.82 64K Enabled Standard 3 Scheduled -
R1/R1-2 File system 110 110 18.23 64K Generic zero reclaim Standard 3 Scheduled -
R1/R1-3 Volume 110 110 0.14 64K Enabled Standard 3 Scheduled -
R1/R1-4 Volume 110 110 0.44 64K Generic zero reclaim Standard 3 Scheduled -
R1/R1-5 Volume 12 12 13.79 64K Enabled Standard 3 Scheduled -

This table shows the column descriptions.

Column Name	Description

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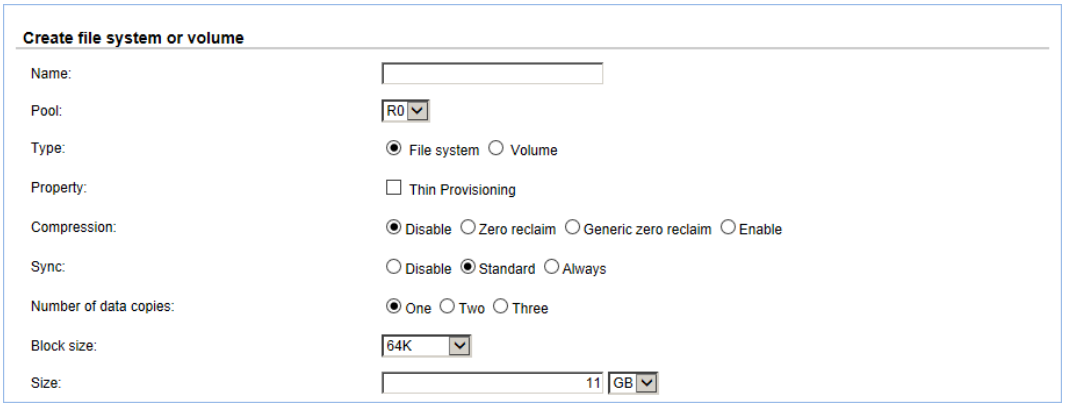
Name	The name of the file system or volume.
Type	File system or volume.
Quota (GB)	The Quota of the file system or volume.
Reserved (GB)	Reserved capacity of the file system or volume.
Used (GB)	Used capacity of the file system or volume.
Block size	The block size of ZFS.
Compress	The status of the compression.
Sync	The status of the sync.
Copies	The number of the copies. (More explanation in Tip.)
Schedule	The status of the schedule.
Original	The original file system or volume of the clone.

The functions are available in this tab:

- **Create:** Create a file system or a volume.
- **Delete:** Delete the selected file systems or volumes.

Take an example of creating a file system or a volume.

1. Click the **Create** icon.



2. Enter a **Name** for the file system or volume.
3. Use the drop-down list to select a **Pool**.
4. Select **Type**, **Property**, **Compression type**, **Sync**, and **Number of Data Copies**.
5. Enter the **Size** for the file system or volume.
6. Click **Apply** button.

TIP:
"Type" has two options – "File system" and "Volume".

- **File system:** File level access and folder sharing. To use with data services such as CIFS, NFS, AFP, FTP, and WebDAV.
- **Volume:** Block level access. To use with iSCSI target function.

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TIP:
"Compression" options:

- **Disabled:** No compression at all. Default value.
- **Zero Reclaim:** When the data block contains all zeros, no physical space will be consumed. The block will be marked specifically.
- **Generic Zero Reclaim:** It will reclaim data blocks with special patterns such as all 0's, all 1's. Theoretically, it will have better storage efficiency.
- **Enabled:** This will always enable lossless data compression function using LZJB algorithm.

TIP:
"Sync" means synchronous I/O, which is similar to the definition of write-through. Synchronous I/O is that every file system transaction is written and flushed to stable storage devices by a system call return. The application needs to wait for the physical data update completion before it could issue another command. Latency will be longer and performance will suffer.

If you don't know how to use this setting, please leave it as default.

- **Disabled:** All write commands become asynchronous. It will ignore the synchronous transaction demands of applications such as database or NFS.
- **Standard:** The default value. It depends on the applications.
- **Always:** All write commands become synchronous even if the application issues asynchronous transactions.

The "Sync" option will be unselectable if "volume" is selected instead of file system. This is because synchronous write function is not supported in iSCSI block access for the time being.

TIP:
"Number of data copies" in Create File System or Volume UI is used to create mirroring of data to avoid data corruption. When the original file corrupts, the system will use the extra "copy" to recover the corrupt file.

The value of two means that when you copy a 10MB file, it will take up 20MB space. The value of three means that it will take up extra double space to store the same data in the same storage pool.

Users will not be able to see the actual extra copies. They are controlled by the file system.

Thin provisioning

The following are the thin provision features:

- Dynamic allocating space to store user data.
- Applied to both file system and volume.
- Remove stranded or reserved-but-unused capacity. Improve storage efficiency.

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How to use thin provisioning?

1. Create a file system with thin provisioning turned ON. The **Size** option will be grey out. Because the upper size limit is the available size of the storage pool, there is no quota size or reserved size.
2. Check the network drive property. The size is the remaining pool size. So it's dynamic.
3. Copy some files to the share. There is no pre-allocated space (reserved size). The used size reflects just the exact amount of the files being copied.

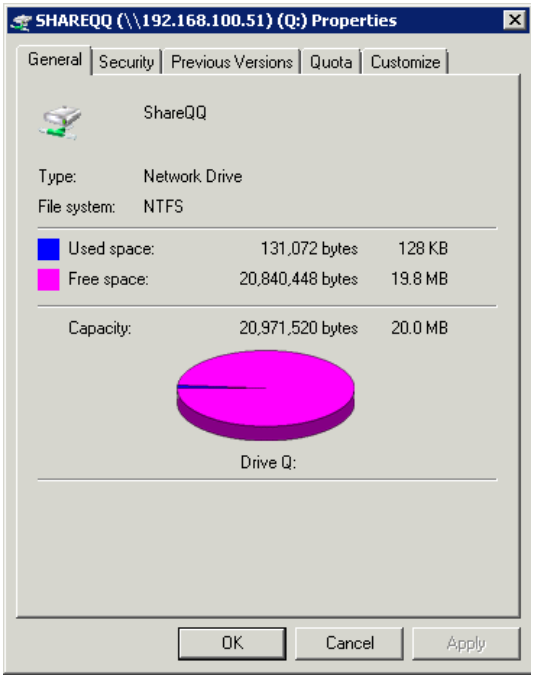
Compression

The following are the compression features:

- Compression algorithm adopts LZJB.
- Applied to both file system and volume.
- Compression can be turned ON and OFF on the fly during I/O.

How to use compression with shares?

1. For example, create a file system of 20MB with compression turned ON.
2. Map the share in Windows as a network drive. And check the drive property.



3. Copy several bitmap files that are over the size of 20MB.

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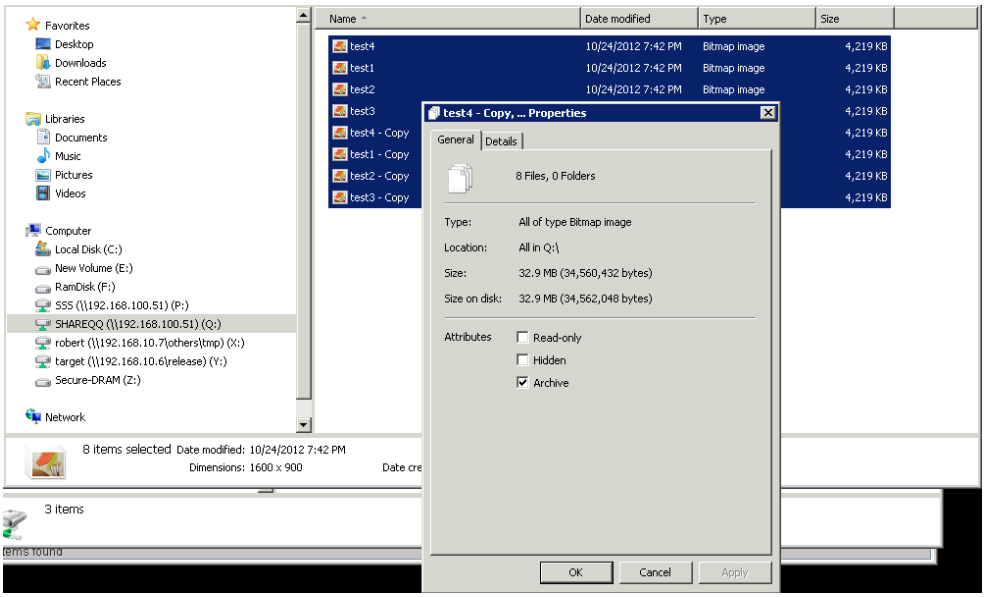
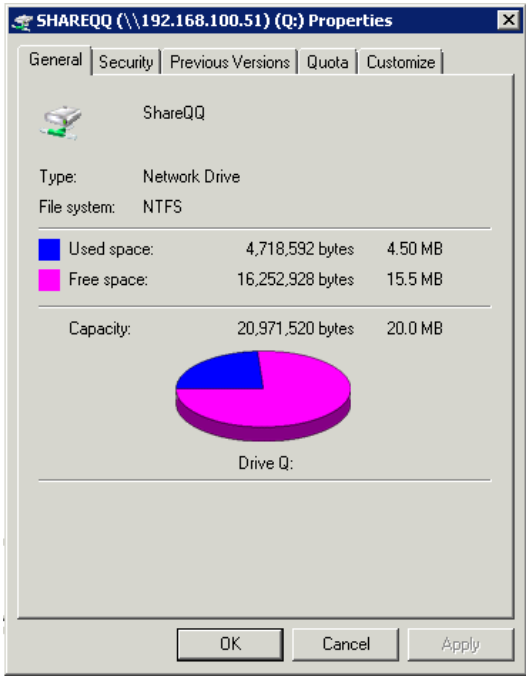


4. Check the network drive property again. The actual space taken is less than 20MB, which means **Compression** is functioning.



Share

The **Share** option is provided to manage the permission of the file system and view the status of each file system. There are **Explorer** and **Shares** tabs.

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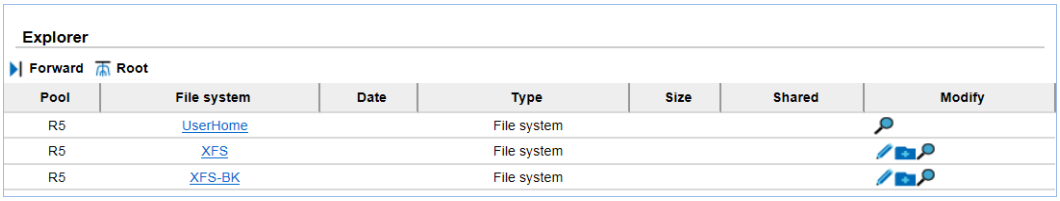
Explorer

The **Explorer** tab provides a simple file explorer to create, edit, search, and delete the folders of the file systems. It also browses the whole storage pool structure.

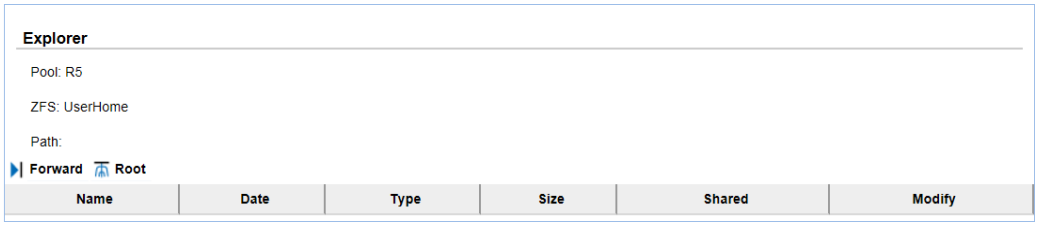


The functions are available in this tab:

- **Forward:** Forward to the previous folder.
- **Root:** Jump to the root of the system.
- **File system:** Enter to the next layer of the folder.
- **Edit:** Edit the share permission of the folder.
- **Create folder:** Create a folder.
- **Search files:** Search the user-specified file in the pool. If it is found, the path will be displayed. So user can locate the file more easily.

Take an example of entering the **UserHome** folder.

1. Click the link of **UserHome**.



The UserHome folder is created for the home directory of each user. It's a default folder by the system and cannot be edited.

Take an example of editing the folder for CIFS, NFS, AFP and FTP.

1. Click the **Edit** icon of the folder.
2. Click the check box to share the folder by **CIFS, NFS, AFP, FTP** protocols.
3. If select NFS protocol, it has to set the **NFS access control rules**. Use **Add** button to add the rules and **Delete** button to delete them.

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TIP:
NFS access control rules:

- **Root squash:** Uncheck this to use no_root_squash setting.
- **Async write:** Check this to use asynchronous write function. The performance will be better than synchronous write.
- **Read only and Read/Write:** Set the read/write permission.
- **IPv4:** Allow a group of computers that are in a certain IP range to access the share.
  - The numbers (1~31) in the drop down list represent the network mask value. It stands for the total number of binary "1" in the network mask. For example, a network mask of 255.255.0.0 in binary form will become 11111111.11111111.0.0. So number 16 will stand for a network mask of 255.255.0.0.
  - Simply provide a valid IP address within your destination range.
- **IPv6:** Same meaning as IPv4 above. Instead it accepts IPv6 address only.
- **Hostname:** Use this option to specify a specific computer for access. There are 3 forms allowed. Putting in an invalid form or value will cause IO error or inability to access the share. Please be careful.
  - A valid IP address
  - A DNS recognized name : the system name or machine name
  - FQDN name : Fully Qualified Domain Name
- **Domain:** Use this option if you want to allow all the computers in a certain network domain to have access to the share.
- **Everyone:** Allow access to computers from all kinds of IP addresses.

CAUTION:
Please be aware that users will only have read permission to their own home directory shares using NFS service. This is due to security purpose and the nature of NFS protocol. This is to avoid users using a matching UID to access someone else's home directory.

4. Select the permission of the **Users and groups**. And check the radio box for **Denied**, **Read-only** or **Read/Write**.
5. Click **Apply** button.

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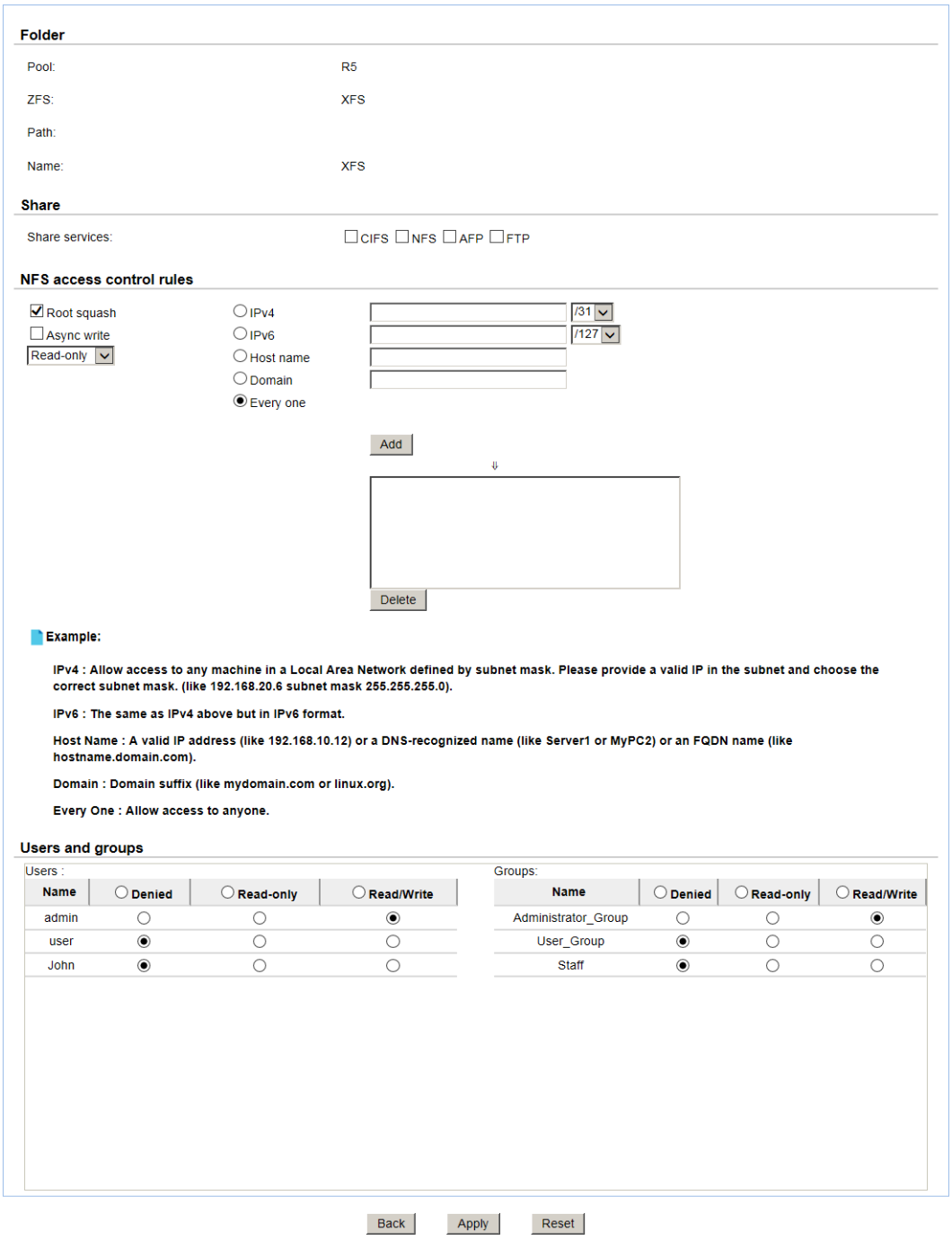

CAUTION:
Be careful of the rules you put in. Users need to have basic knowledge about how to set up NFS exports parameters. The system will not do validation check for you. It's up to user's discretion to provide the correct rules.

Take an example of editing the folder for WebDAV.

1. Click the **Edit** icon of the folder.
2. Click **WebDAV** tab.

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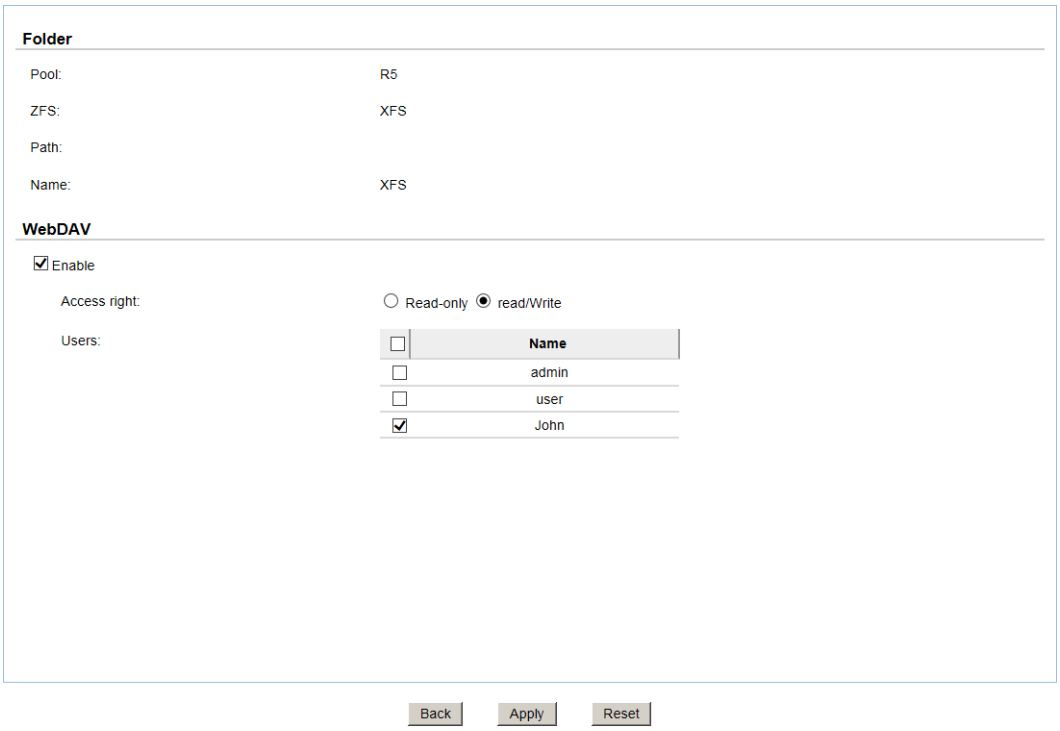

3. Click the check box to share the folder by **WebDAV** protocol.
4. Select the permission of the **Users and groups**. Check the radio box of **Access right** for **Read-only** or **Read/Write**. And then select the users.
5. Click **Apply** button.

Take an example of creating a folder.

1. Click the **Create folder** icon of the folder.

2. Enter a folder name.
3. Click the check box to share the folder by **CIFS, NFS, AFP, FTP** or **WebDAV** protocols.
4. Click **Apply** button.

Take an example of searching the files.

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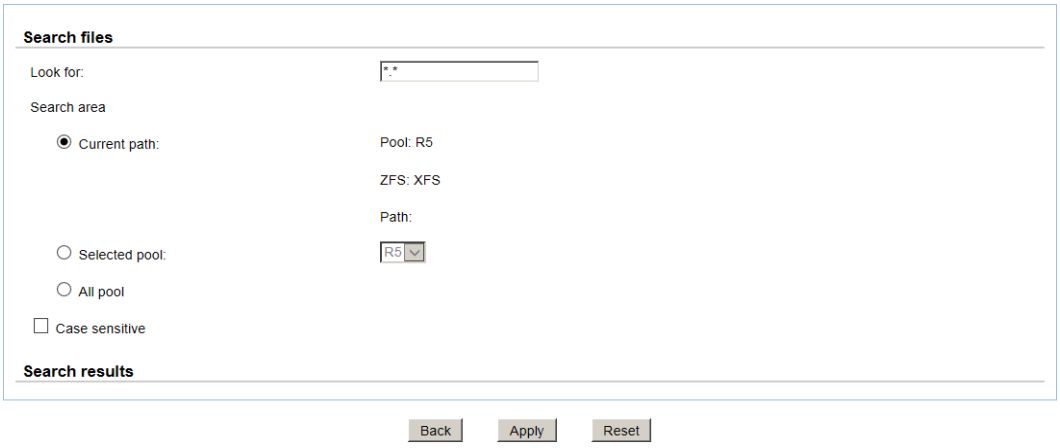
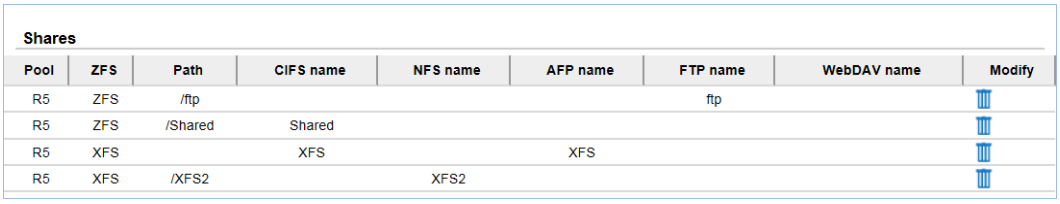
1. Click the **Search files** icon.



2. Enter a file name which wants to be searched. It can use wildcard “*”.
3. Click **Apply** button.
4. The results will be displayed in the **Search results** area.

Shares

The **Sharing** tab of the operation area is provided to remove the share or view the status of the shares.



This table shows the column descriptions.

Column Name	Description
Path	Share directory.
Pool	Pool name.
ZFS	ZFS name.
CIFS name	Share name for CIFS.
NFS name	Share name for NFS.
AFP name	Share name for AFP.
FTP name	Share name for FTP.
WebDAV name	Share name for WebDAV.

The function is available on the share:

- **Delete:** Delete the share.

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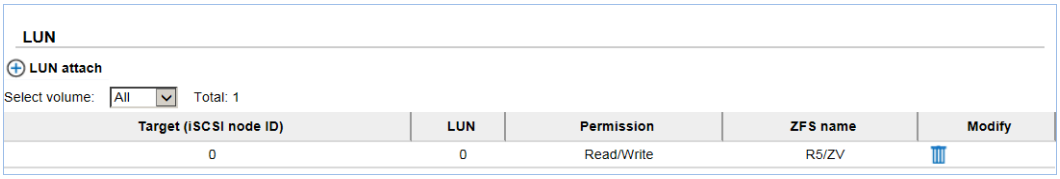
LUN

The **LUN** option provides functions to manage iSCSI volumes such as attach, detach or view the status of logical unit numbers for each volume.



This table shows the column descriptions.

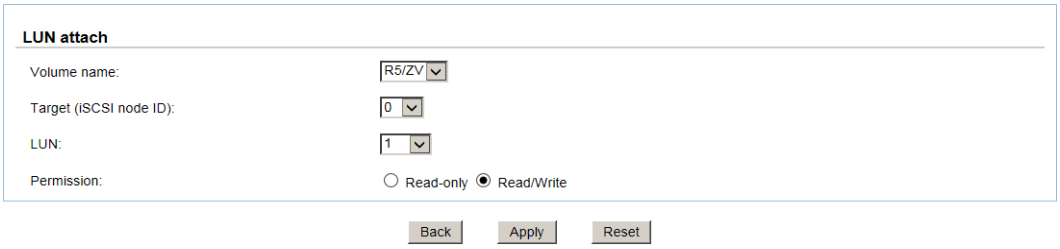
Column Name	Description
Target	The number of the target.
LUN	The number of the LUN assigned.
Permission	The permission level: • Read/Write. • Read-only.
ZFS name	The name of the volume assigned to this LUN.

The functions are available in this tab:

- **LUN Attach:** Attach a logical unit number from a volume.
- **LUN Detach:** Detach a logical unit number from a volume.

Take an example of attaching a LUN.

1. Click the **LUN Attach** icon.



2. Select the volume from the drop-down list.
3. Select the Target number from the drop-down list.
4. Select the LUN number from the drop-down list.
5. Choose the Permission level.
6. Click **Apply** button.

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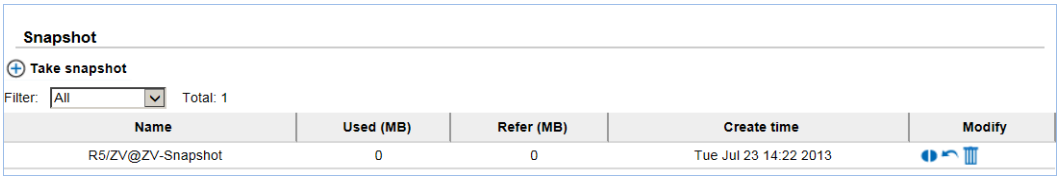
Snapshot

The **Snapshot** option provides functions to manage snapshot activities such as take snapshot, rollback, clone, delete, or view the status of the snapshots.

Snapshot can only be applied to the whole file system or volume. Snapshot cannot be applied to specific shared folders.



This table shows the column descriptions.

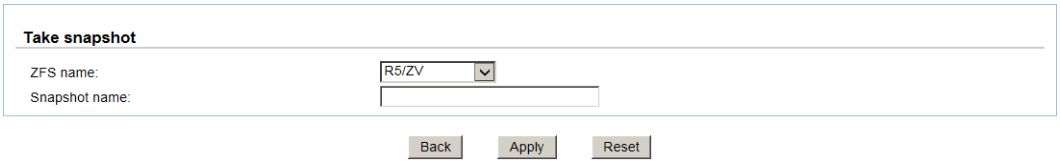
Column Name	Description
Name	The snapshot name.
Used (MB)	The amount of snapshot space that has been used.
Refer (GB)	The refer capacity of the file system or volume.
Created time	The time the snapshot is created.

The functions that are available in this tab:

- **Take Snapshot:** Take a snapshot.
- **Clone:** Clone the file system or volume.
- **Rollback:** Rollback the snapshot file system or volume.
- **Delete:** Delete the snapshot file system or volume.

Take an example of taking a snapshot.

1. Click the **Take snapshot** icon.



2. Use the drop-down list to select a **ZFS name**.
3. Enter a **Snapshot name** for the snapshot.
4. Click **Apply** button.

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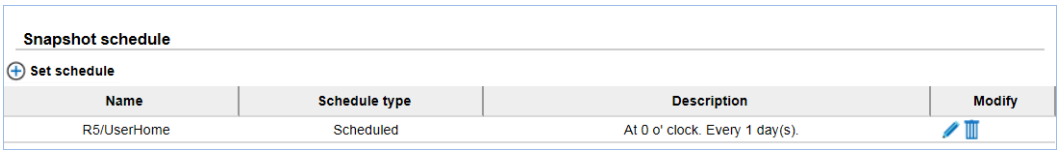
Snapshot Schedule

The **Snapshot schedule** tab provides the functions to set schedule snapshots.



This table shows the column descriptions.

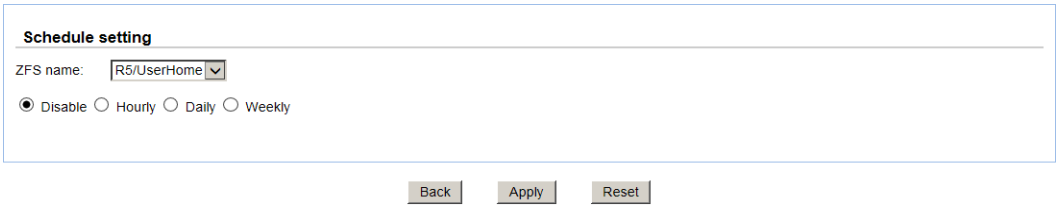
Column Name	Description
Name	The snapshot name.
Schedule type	Disabled or Scheduled.
Description	Schedule details.

The functions are available in this tab:

- **Set schedule:** Set the snapshot schedule on a file system or a volume.
- **Edit:** Modify the schedule settings.
- **Delete:** Delete the schedule snapshot.

Take an example of setting a schedule snapshot.

1. Click the **Set schedule** icon.



2. Select the ZFS name.
3. Select the radio box for Hourly, Daily or Weekly. According to the different schedule type, input the proper parameters.

Application Configuration

The **Application configuration** menu option is for accessing the **Directory service**, **CIFS**, **NFS**, **AFP**, **FTP, WebDAV, iSCSI, Backup** and **AntiVirus** options.

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Directory Services

The **Directory services** option provides three directory services. Default is **Standalone**, which supports local account only. The others are **Active Directory** for Windows and **LDAP** services.

UnifiedAUTH mechanism is the backbone of all the directory services. It simplifies the use of all the data services (CIFS, NFS, AFP, FTP, WebDAV, iSCSI) and frees the users from memorizing different account/password sets for different data services. The benefits are:

- Easier use of all data services
- Simplified management

Only one directory service can be enabled at all time. No two directory services can be enabled at the same time. Switching directory service will result in losing Access Control List of all shares from the previous directory service.

Select the radio button to change the directory service:

- **Standalone**

  Standalone support local user/group accounts only. It's the default setting.

  When it is done, click **Apply** button.

- **Active Directory**

  Active Directory service supports Windows Server 2003 and 2008 Active Directory to manage the accounts. The maximum number of AD users and groups is 65536.

  Enter the settings of Active Directory above. When it is done, click **Apply** button. If the information is correct, the AD accounts will be added in **System configuration -> Account -> User account -> Domain user** and **Group account -> Domain group**. It will take some time to download the accounts at the first time. And then it will synchronize with the server automatically.

TIP:
In order to make sure you can successfully login Active Directory server, please make sure the following two requirements are met.
Primary DNS (Domain Name Server) setting is identical to that of the Active Directory server.
The system time is synchronous with that of the Active Directory server with less than 1 minute tolerance.

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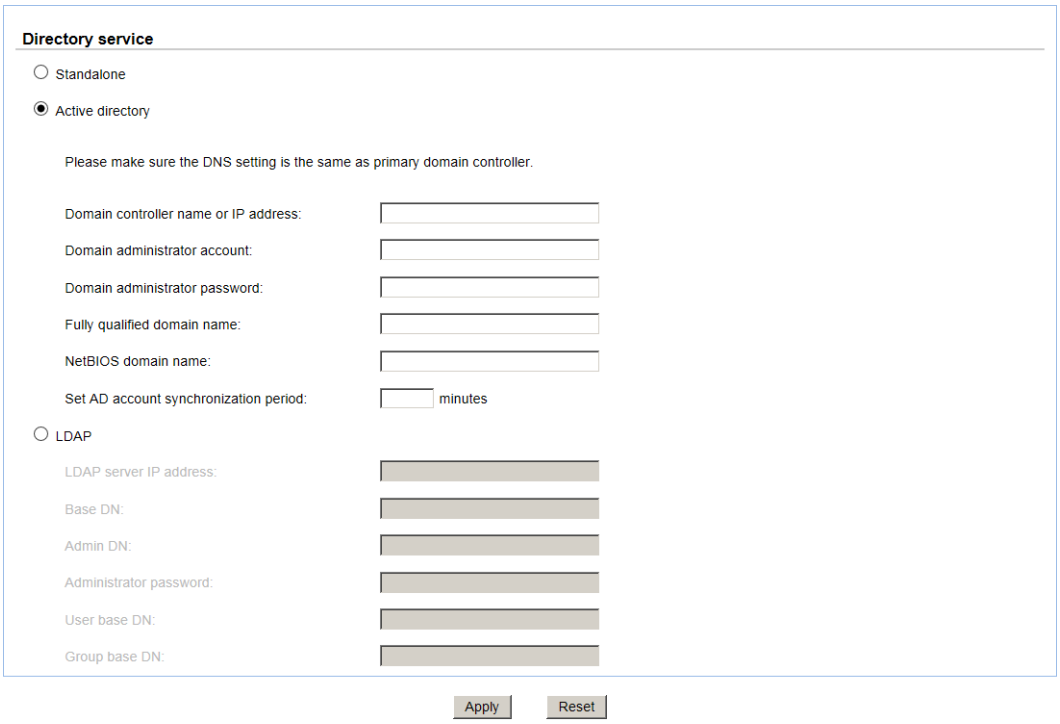

- **LDAP**

  LDAP (Light-weighted Directory Access Protocol) service supports LDAP version3 to manage the accounts. The maximum number of LDAP users and groups is 65536.

  Enter the settings of LDAP above. When it is done, click **Apply** button. If the information is correct, the accounts will be added to **System configuration -> Account -> User account -> Domain user** and **Group account -> Domain group**.

  Base DN: The base distinguished name (DN) indicates where in the LDAP directory you wish to load users and groups. It is the top level of the LDAP directory tree to be used when searching for resources. Suppose that all user accounts and groups are located in the "Users" folder under your domain. In LDAP form, it is **cn=Users,dc=<your domain>**. Let's say your domain is **aaa.bbb.com.** The Base DN you should put in is **cn=Users,dc=aaa,dc=bbb,dc=com**.

  Admin DN: By default, the administrator DN is in the form **cn=Administrator,dc=<your domain>**. Using previous example, The Admin DN should be put in is **cn=Administrator,dc=aaa, dc=bbb,dc=com**.

TIP:
Please contact your LDAP server administrator for the correct login parameters for Base DN, Admin DN, User base DN, and Group base DN.

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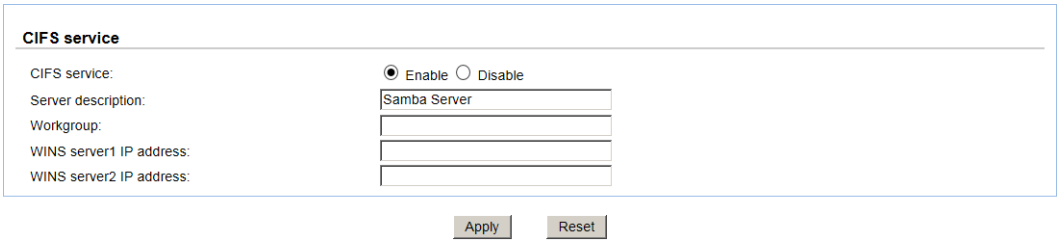
CIFS Service

The **CIFS** (Common Internet File System) option is used to setup CIFS protocol. The CIFS is a network protocol that offers file services for Windows computers. The unified storage provides CIFS capability without the need for a Windows server in the network. Starting this service will open the following ports on the unified storage system:

- TCP 139 (smbd)
- TCP 445 (smbd)
- UDP 137 (nmbd)
- UDP 138 (nmbd)



This table shows the row descriptions.

Row Name	Description
CIFS Service	Enable or Disable.
Server description	Default is “Welcome to CIFS server”. Maximum length is 256 characters.
Workgroup	Default is “Workgroup”. Maximum length is 16 characters.
WINS server 1 IP address	WINS Server IP Address. Default is empty. If it’s empty, the name resolution priority is DNS only. Otherwise, the name resolution priority is WINS server first, and then DNS.
WINS server 2 IP address	The same as above.

When it is done, click **Apply** button.

NFS Service

The **NFS** (Network File System) option is used to setup NFS protocol. NFS is a protocol for sharing files and directories on a network among Linux machines and Unix machines.

Starting this service will open the following ports on the unified storage system:

- TCP 111 (rpcbind)
- TCP 2049 (nfsd)
- UDP 111 (rpcbind)
- Additionally, mountd and rpcbind will each bind to a randomly available UDP port.

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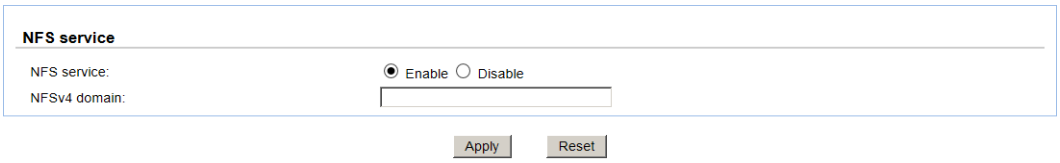


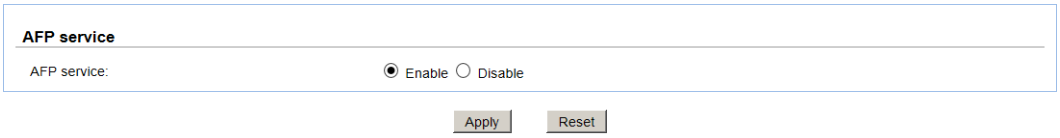
If you are using NFSv4 protocol, please make sure NFSv4 domain is provided in order to have ID mapping function working correctly. When it is done, click **Apply** button.

AFP Service

The **AFP** (Apple Filing Protocol) option is used to setup AFP protocol. The AFP is a network protocol that offers file sharing services for Mac computers.

Starting this service will open the following ports on the unified storage system:

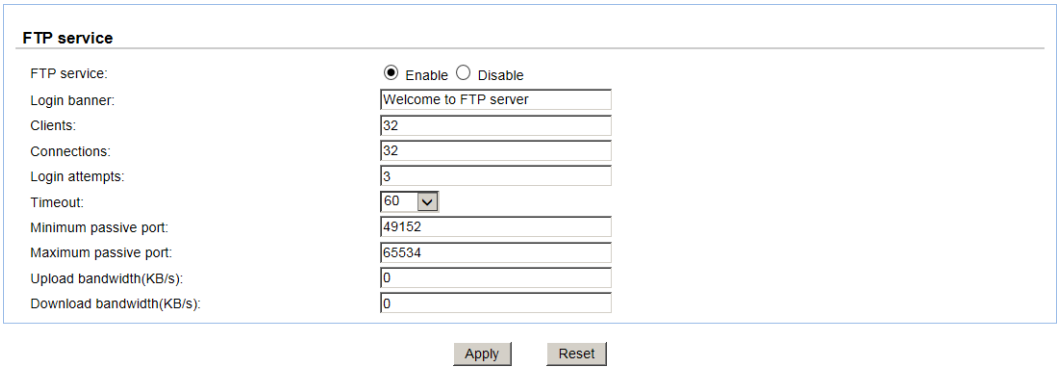
- TCP 548 (afpd)
- TCP 4799 (cnid_metadata)
- UDP 5353 and a random UDP port (avahi).



Enable or Disable the AFP protocol, and then click **Apply** button.

FTP Service

The **FTP** (File Transfer Protocol) option is used to setup FTP protocol. It allows you to configure the FTP server so that users can browse and download data using their web browser or FTP client software. FTP is easy to use and it is cross-platform. All major operating systems have FTP client function.



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This table shows the row descriptions.

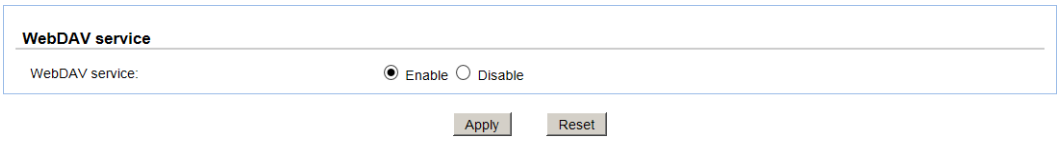
Row Name	Description
FTP Service	Enable or Disable.
Login banner	Configurable login banner. Default is “Welcome to FTP server”. Max characters are 256.
Clients	The maximum number of simultaneous clients, default is 20, range is 1 ~ 4096.
Connections	The maximum number of connections per IP address, default is 32, range is 1 ~ 32.
Login attempts	The maximum number of attempts before client is disconnected, default is 3, range is 3 ~ 32.
Timeout	The maximum client idle time in seconds before client is disconnected, default is 60 (sec), valid values are 30, 60, 300, 600, 1800, 3600.
Minimum passive port	The minimum passive port, default is 49152, range is 1024 ~ 65535.
Maximum passive port	The maximum passive port, default is 65534, range is 1024 ~ 65535.
Upload bandwidth(KB/s)	The upload bandwidth, in KB/s, default is 0 (no limit)
Download bandwidth(KB/s)	The download bandwidth, in KB/s, default is 0 (no limit)

When it is done, click **Apply** button.

WebDAV Service

The **WebDAV** (Web Distributed Authoring and Versioning) option is used to setup WebDAV protocol. It is an extension of HTTP v1.1 protocol that allows users to manage files across different operating system platforms. Starting this service will open the following ports on the unified storage system:

- TCP 80 (httpd)



Enable or Disable the WebDAV protocol, and then click **Apply** button.

iSCSI

The **iSCSI** (Internet SCSI) option is used to setup iSCSI entity name for block-based access. iSCSI is a protocol standard that allows the consolidation of storage data. iSCSI allows the system to act like a storage area network (SAN) over an existing Ethernet network. Specifically, it exports disk devices over an Ethernet network that iSCSI clients (called initiators) can attach to and mount.

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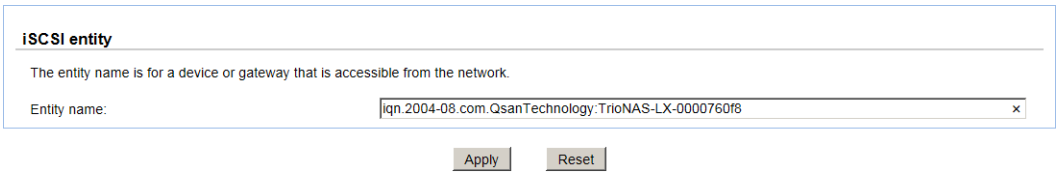
iSCSI Entity

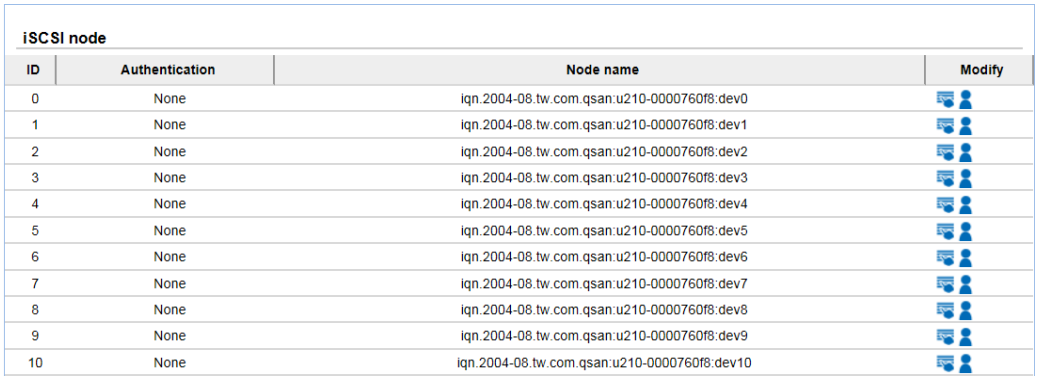
This tab can modify iSCSI entity name.



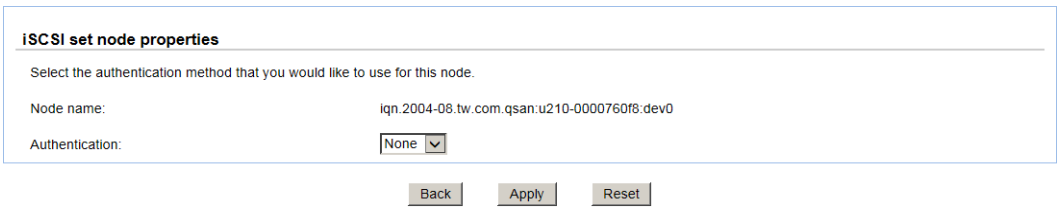
Enter the iSCSI entity name, and then click **Apply** button.

iSCSI Node

This tab can manage iSCSI node.



Click **Set Properties** icon to set the iSCSI properties.



CHAP (Challenge Handshake Authentication Protocol) is a strong authentication method used in point-to-point for user login. It's a type of authentication in which the authentication server sends the client a key to be used for encrypting the username and password. CHAP enables the username and password to transmit in an encrypted form for protection.

If you want to use CHAP authentication, select **CHAP** from the drop-down list, and then click **Apply** button.

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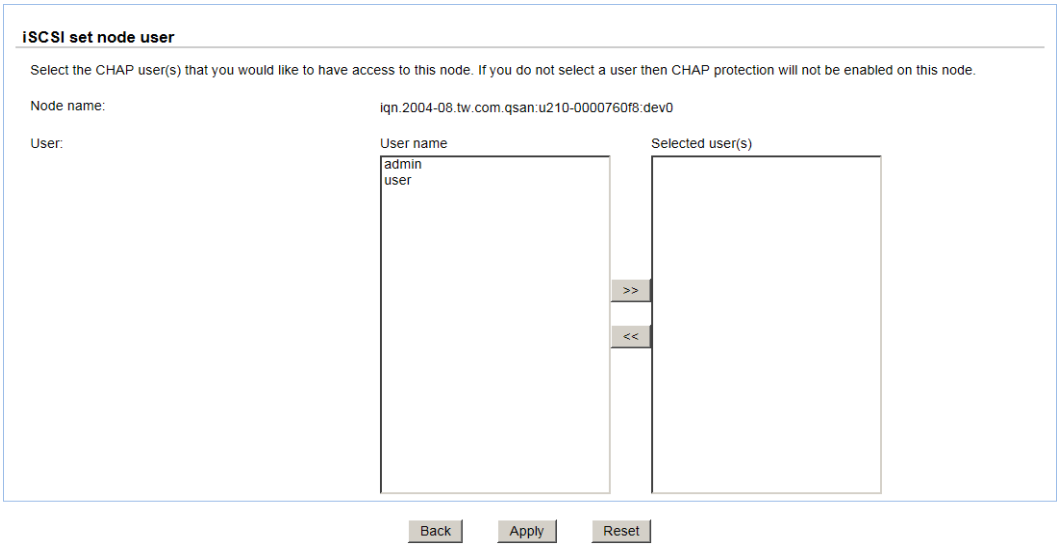
Click **Set User** icon to set the iSCSI CHAP users.



Multi-select which CHAP user(s) will be used and click the **>>** button. It can be more than one, but it must be at least one for CHAP to work. When it's done, click **Apply** button.

Backup

The **Backup** option provides functions to set up the backup services. Currently, it supports Replication and Amazon S3 services.

Both Amazon S3 and replication services are applied to the whole file system or volume, which is the right next level to the storage pool. None of backup services can be applied to specific shared folders.

Replication

The **Replication** tab is used to setup the replication service. It supports local cloning and remote replication to other unified storage arrays. There is no limit to the number of how many local cloning and remote replication tasks can be created. If you experience slow system performance, please reduce the replication tasks. It supports one-to-one replication tasks but not one-to-many. The same replication source cannot coexist in different tasks. The max task number is limited as 16 tasks.

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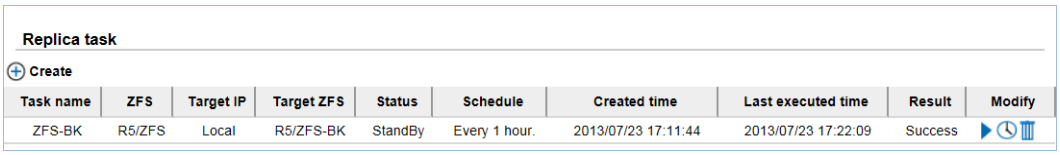

This table shows the column descriptions.

Column Name	Description
Task name	The task name.
ZFS	The source name of the file system or volume.
Target IP	Local or the remote target IP.
Target ZFS	The target name of the file system or volume.
Status	Standby or Running.
Schedule	Disabled or scheduled.
Created time	The created time of the task.
Last executed time	The last executed time.
Result	The physical disk slots of the RAID set.
Spare slot	The spare physical disk slot.

The functions available in this tab are:

- **Create:** Add a replication task.
- **Start:** Start the task.
- **Stop:** Stop the task.
- **Schedule:** Schedule the task.
- **Delete:** Delete the task.

Take an example of adding a task.

1. Click **Create** icon.
2. Enter the **Task name**, and select a file system or volume to replicate. Then click **Next** button.
3. Select the **Local cloning** or **Remote replication**. Remote replication needs to enter the target IP, username and password. And then click **Next** button.
4. Select the target pool and enter a name. And then click **Next** button.
5. At the confirmation message, click **Apply** button.

Amazon S3

The **Amazon S3** tab is used to setup the popular cloud backup service provided by Amazon. Before using the service, you must register an Amazon S3 account first at http://aws.amazon.com/s3/. There is no limit to the number of how many Amazon S3 tasks can be created. If you experience slow system performance, please reduce the Amazon S3 tasks.

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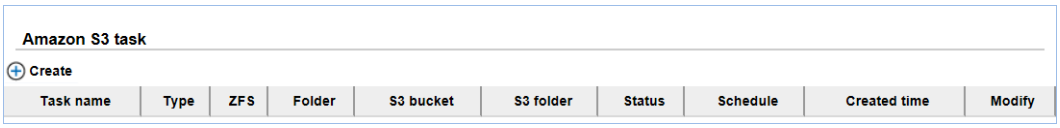

This table shows the column descriptions.

Column Name	Description
Task name	The task name.
Type	Upload or download.
ZFS	The source name of the file system or volume.
Folder	The folder name.
S3 bucket	The S3 bucket name.
S3 folder	The S3 folder name.
Status	Standby or Running.
Schedule	Disabled or scheduled.
Created time	The created time of the task.

The functions are available in this tab:

- **Create:** Add a backup task to Amazon S3 service.
- **Edit:** Edit the task.
- **Start:** Start the task.
- **Stop:** Stop the task.
- **Schedule:** Schedule the task.
- **Delete:** Delete the task.

Take an example of adding a task.

1. Click **Create** icon.
2. Enter the **Task name**, select the **Local path**, and enter the folder.
3. Select the **Backup type**, Upload or Download, enter the **Access key**, **Private Key** and the **Bucket/Folder** for Amazon S3 settings. Check the box when you need to delete extra files in the destination folder.
4. Click **Test connection** button to test the connection if necessary.
5. Click **Apply** button to create a task.

AntiVirus

The **AntiVirus** option is for accessing the **AntiVirus service, AntiVirus scan filter, AntiVirus task, AntiVirus update** and **AntiVirus report** option tabs. It uses McAfee antivirus engine which is an American global computer security software company.

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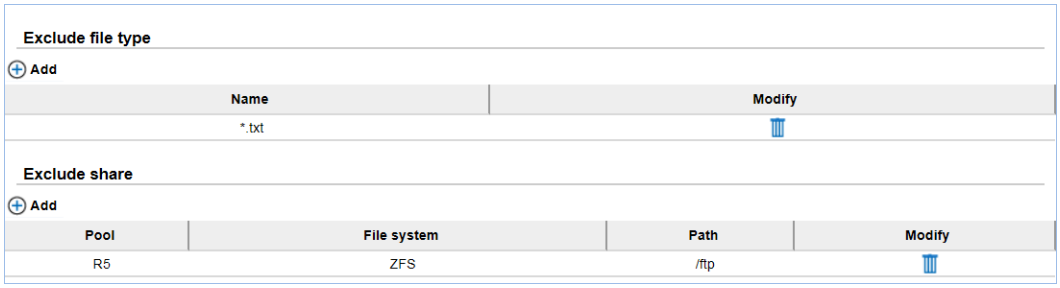
AntiVirus Service

This tab can enable or disable antivirus service.

Check Enable or Disable button, and then click **Apply** button.

AntiVirus Scan Filter

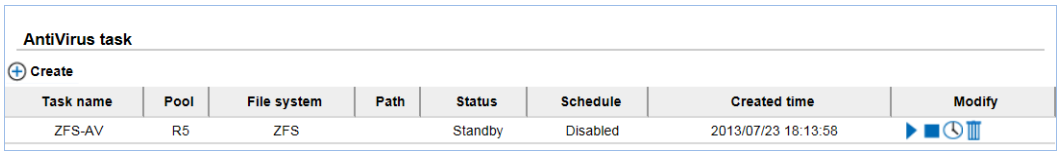
This tab manages what files exclude to be scanned.



Click **Add** icon of the **Exclude file type**, add a text for file extension, then click **Add** button. These file extensions will be skipped when executing antivirus scanning. The same goes for **Exclude share**.

AntiVirus Task

This tab manages the antivirus tasks.



This table shows the column descriptions.

Column Name	Description
Task name	The task name.
Pool	The pool name.
File system	The file system name.
Path	The path of the file system.

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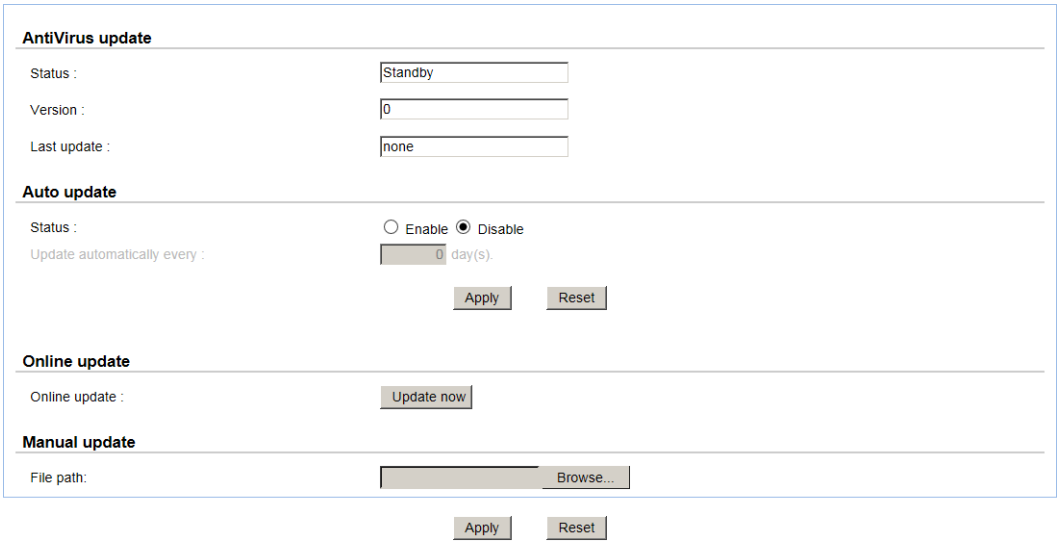
Status	Standby or Running.
Schedule	Disabled or scheduled.
Created time	The created time of the task.

The functions are available in this tab:

- **Create:** Add a antivirus task.
- **Start:** Start the task.
- **Stop:** Stop the task.
- **Schedule:** Schedule the task.
- **Delete:** Delete the task.

AntiVirus Update

This tab manages the update of virus pattern files.



Select **Enable** to enable **Auto update**, enter a number for the amount of days the update will execute automatically. Click **Apply** button to take effect.

Or click **Update Now** button to update immediately. If you have the update file, it also can be updated manually.

AntiVirus Report

This tab displays the report of the infected files.

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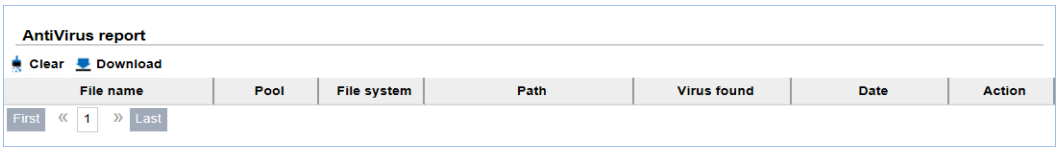


Click **Download** icon to save the report.

Maintenance Configuration

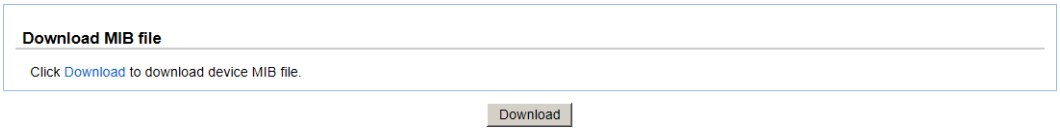
The **Maintenance Configuration** menu option is for accessing the **Download**, **Reset to factory default**, **Firmware upgrade**, **Reboot**, and **Shutdown** options.

Download

Download option provides two services. There are **Download MIB file** and **Download system information**.

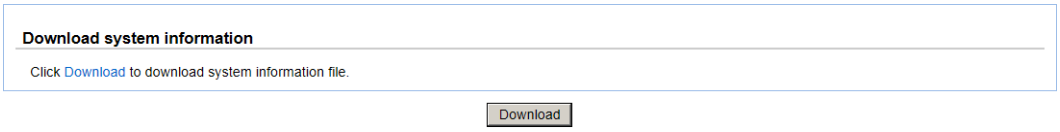
Download MIB File

The **Download MIB file** tab provides to download MIB file for SNMP usage.



Download System Information

The **Download system information** tab will download a compressed file to your local drive. It contains event logs, debug information, and system configuration data. Please send this compressed file to us when you need technical assistance.



Reset to Factory Default

The **Reset to factory default** option allows users to reset the system configurations back to the factory default settings.

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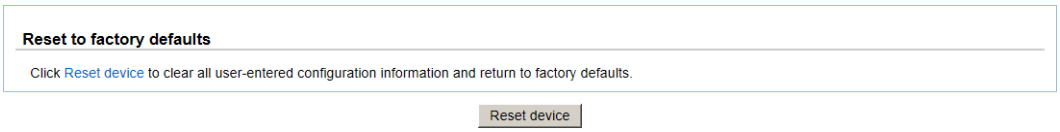

Reset to factory defaults
Click Reset device to clear all user-entered configuration information and return to factory defaults.
Reset device

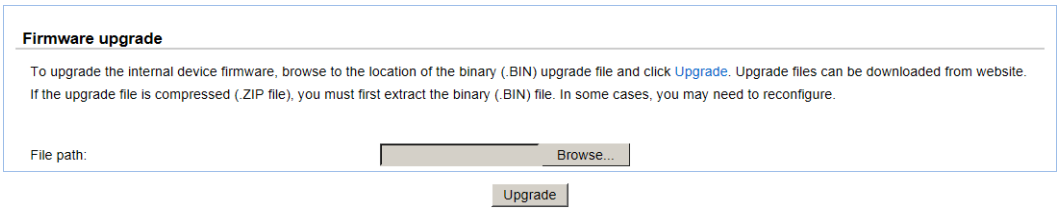
It will perform the following major tasks

- Restore Admin password to 1234
- Reset management port to DHCP. If the network environment does not have DHCP server, the IP address will fallback to zero config.
- Clear all user/group accounts and default directory service to Standalone.
- Clear all access right settings for shares.
- Clear all snapshot, replication, backup tasks.

Please be aware that “Reset to factory defaults” will not delete the user data in UserHome file system. If you create a local user account with the very same name, the system will see it as the same user and use the original user account folder.

Firmware Upgrade

The **Firmware Upgrade** is used to upgrade controller firmware.


Firmware upgrade
To upgrade the internal device firmware, browse to the location of the binary (.BIN) upgrade file and click Upgrade. Upgrade files can be downloaded from website.
If the upgrade file is compressed (.ZIP file), you must first extract the binary (.BIN) file. In some cases, you may need to reconfigure.
File path:
Browse...
Upgrade

Please prepare new controller firmware file named “xxxx.bin” in local hard drive, then click **Browse** to select the file. Click **Upgrade** button to start upgrading the firmware. When upgrading, there is a percentage displayed. After upgrading is finished, the system must reboot manually so the new firmware can take effect.

Firmware Upgrade via USB

Below are the instructions of how to use this function and some requirements.

1. Copy the checksum file (md5sum.txt) and firmware file (*.bin or *.flash) to the root of USB drive.
2. In the root of USB drive, create a pure text file named AutoRun.ini with the following content.

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[upgrade]

upgrade_md5file = md5sum.txt

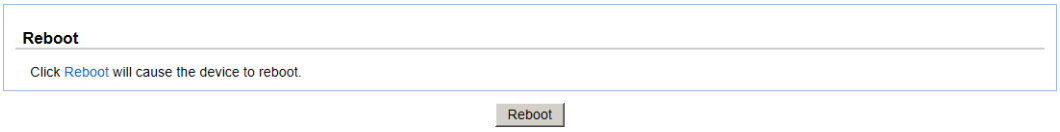
3. Insert USB drive to the USB port shown below in different models.
4. The system will detect USB drive and the firmware. If the setting is correct, the firmware will start upgrading will automatically. The web UI does not have a progress meter.
5. If upgrading is successful, the hard drive LED will blink for 10 seconds and the buzzer will be on for 10 seconds. If upgrading fails, the hard drive LED and the buzzer will turn on for 2 seconds and off for 2 seconds 3 times.

Some requirements:

- USB drive file system supports NTFS and FAT32 only.
- Firmware file name cannot be renamed.
- During firmware upgrading, USB drive cannot be pulled out.
- If firmware version is the same, upgrading will not start.

Reboot

The **Reboot** option is used to reboot the system.



Shutdown

The **Shutdown** option is used to shutdown the system. Before powering off the system, it is highly recommended to execute **Shutdown** function to flush the data from cache onto the physical disks. The step is important for data protection.

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Access Shares from Your Operating System

Introduction

There are five data services provided by the Unified Storage. This chapter will show you how to access shares from different operating systems. We will introduce CIFS/Samba, NFS, FTP, AFP, and WebDAV. Before you can access the shares, please make sure that you have enabled file sharing services and related settings in Sharing of Chapter 4.

CIFS and Windows

There are several ways to access a network share in Windows XP and Windows 7 operating systems. It all follows Windows UNC (Universal Naming Convention) format.

Syntax:

\\<NAS system name>\<share name>

\\<IP address of NAS>\<share name>

<NAS system name> can be found from menu bar **System Configuration -> System**.

<IP address of NAS> is the IP address of one of the network ports. It can be found from menu bar **Network Configuration -> Network Setting**.

Method 1: The Address Input in Explorer

Open a Windows Explorer from **Start** button or by pressing **Start key + E**. In the address input, put in the share path and press Enter. Please refer to the screenshot below.

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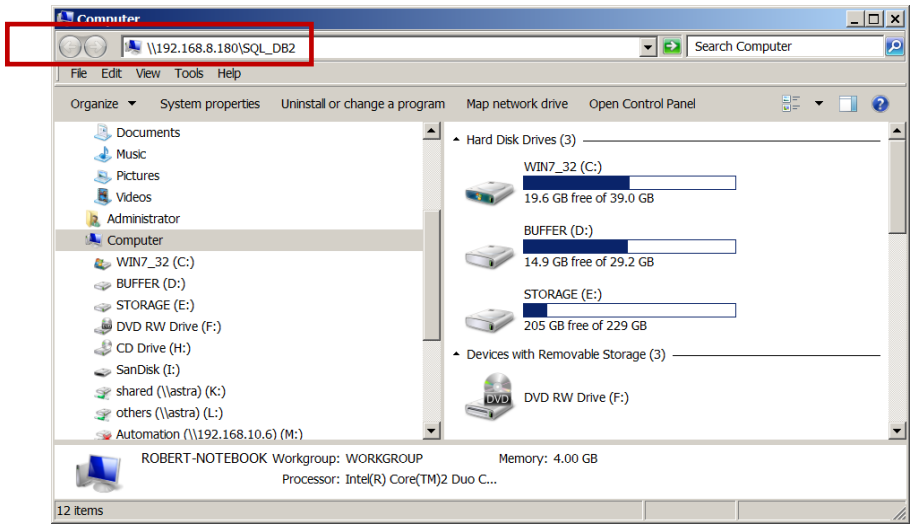
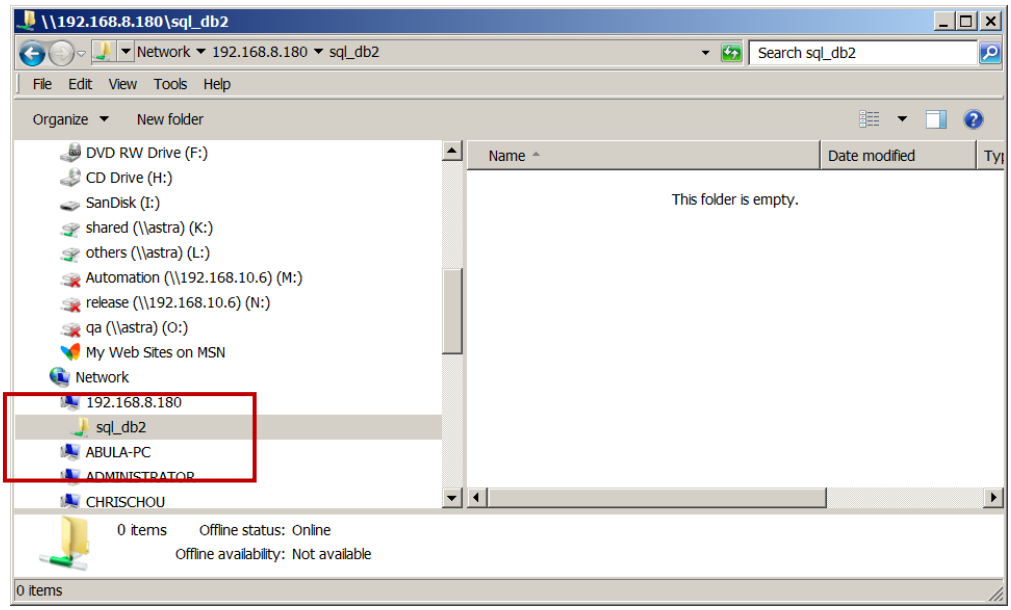


Windows will pop up a dialog requesting for an account and password. Please put in your account and password. When the authentication is clear, the share is ready for you to use as follows:



Method 2: The Command Line Input from Start Button

Click **Start** button to bring up the start menu. In the command line input, put in the share path and press **Enter**. The rest is the same as described in Option 1.

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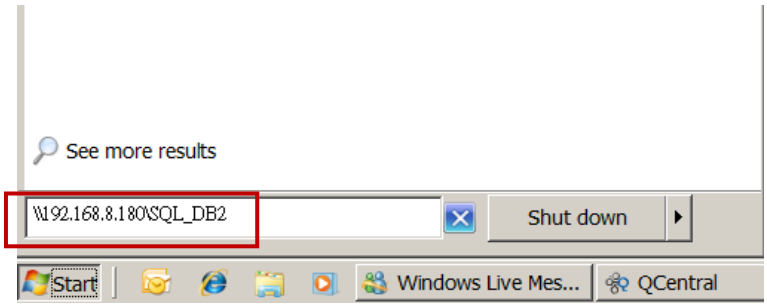
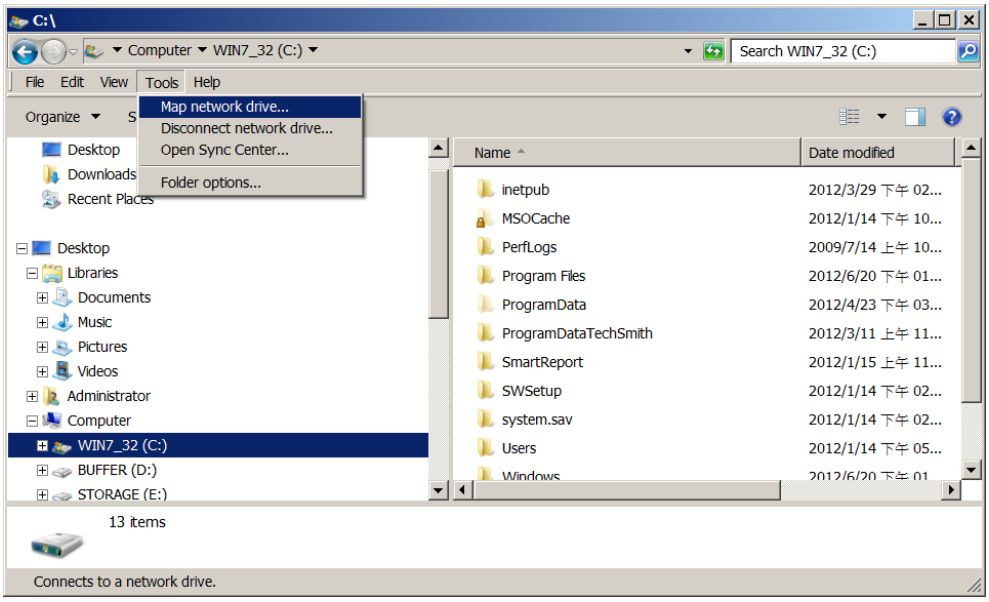


Method 3: Map a Network Drive in Explorer

Please follow the steps below to map a network share from the unified storage to a drive letter. The network share will be automatically mapped the next time you boot your Windows.

1. Open a Windows Explorer from **Start** button or by pressing **Start key + E**. Go to **Tools** and select **Map network drive**.



2. Select the drive letter you like. Put the share path in **Folder**. Make sure you check **Reconnect at logon**. Click **Finish**.

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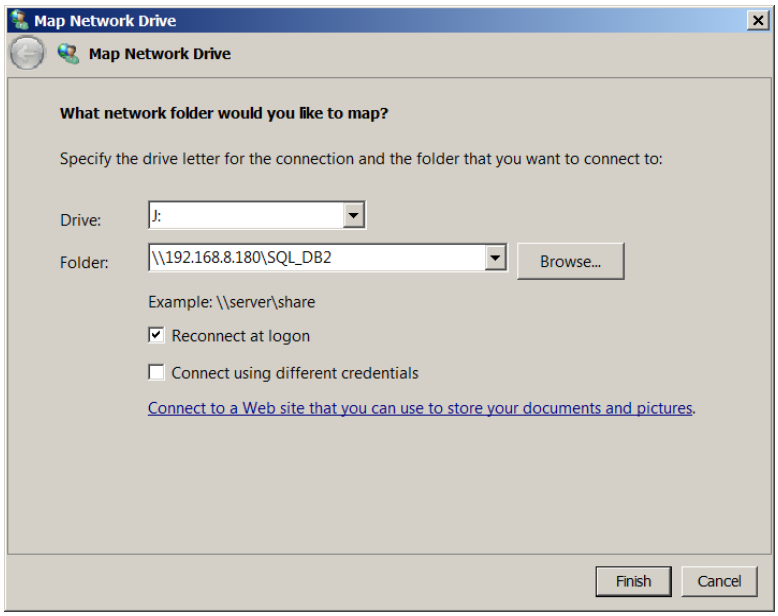
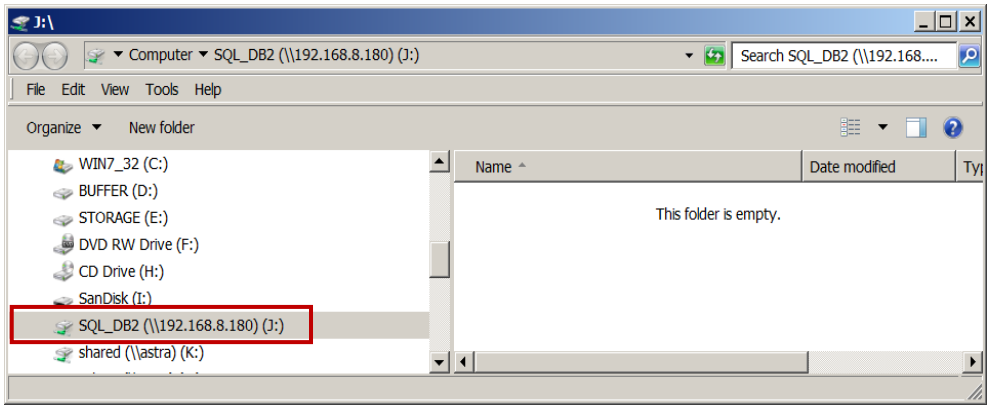

Map Network Drive
Map Network Drive
What network folder would you like to map?
Specify the drive letter for the connection and the folder that you want to connect to:
Drive:
J:
Folder:
\\192.168.8.180\SQL_DB2
Browse...
Example: \\server\share
Reconnect at logon
Connect using different credentials
Connect to a Web site that you can use to store your documents and pictures.
Finish
Cancel

3. You may find a new drive with the letter you just selected in Explorer. You may start using the new drive then.



NFS and Linux

The Unified Storage supports NFS version 3 and version 4. If version 4 connections cannot be established, the system will automatically try to establish the connection using version 3 protocols. Before using the NFS shares, please make sure the NFS settings of the shares are properly configured.

Redhat Linux 5

When mounting a file system in Redhat Linux 5, Redhat Linux 5 uses NFS version 3 by default. Use the following syntax to mount an NFS share. Please make sure you add the keyword – **nfs-share** before the share name. It represents the absolute path that the end user doesn't need to know.

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mount <IP address of NAS>:/nfs-share/<share name> <mount point>

For example:

mount 192.168.8.180:/**nfs-share**/SQL_DB2 /mnt/nas

Redhat Linux 6

The default attempt will try to use NFS version 4 protocol to set up connection in Redhat Linux 6. Use the following syntax to mount an NFS share.

mount <IP address of NAS>:/<share name> <mount point>

For example:

mount 192.168.8.180:/SQL_DB2 /mnt/nas

Open Solaris 10/11

Open Solaris 10/11 will use NFS version 4 as a default. Use the following syntax to mount an NFS share.

mount -F nfs -o rw <IP address of NAS>:/<share name> <mount point>

For example:

mount -F nfs -o rw 192.168.8.180:/SQL_DB2 /mnt/nas

NFS and vShpere5

/nfs-share/<share name>

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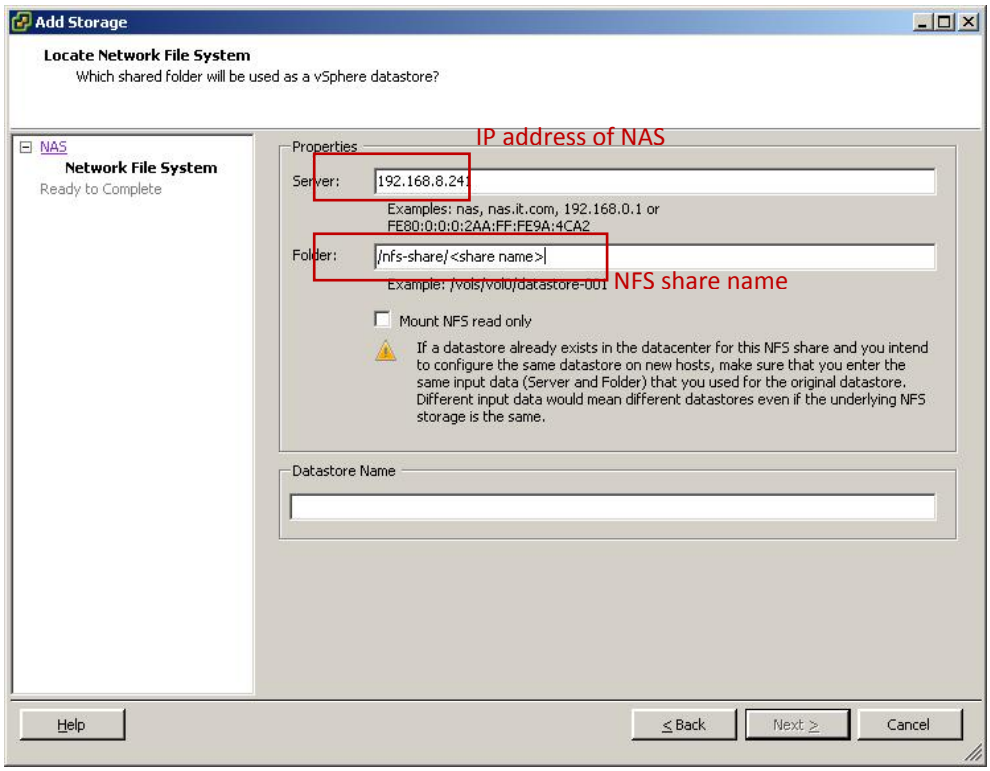
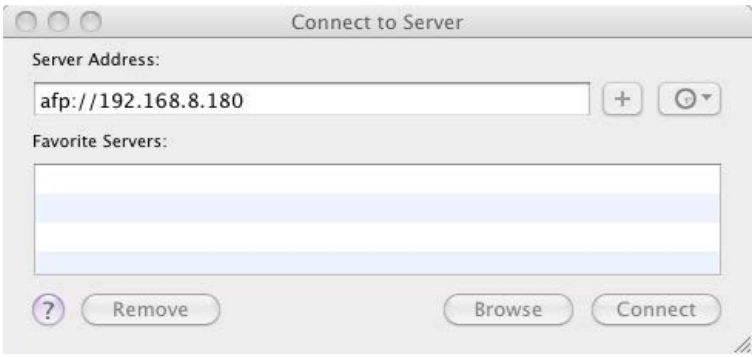

Add Storage
Locate Network File System
Which shared folder will be used as a vSphere datastore?
NAS
Network File System
Ready to Complete
IP address of NAS
Properties
Server:
192.168.8.241
Examples: nas, nas.it.com, 192.168.0.1 or FE80:0:0:0:2AA:FF:FE9A:4CA2
Folder:
/nfs-share/<share name>
Example: /vols/vol0/datastore-001
NFS share name
Mount NFS read only
If a datastore already exists in the datacenter for this NFS share and you intend to configure the same datastore on new hosts, make sure that you enter the same input data (Server and Folder) that you used for the original datastore. Different input data would mean different datastores even if the underlying NFS storage is the same.
Datastore Name
Help
≤ Back
Next ≥
Cancel

AFP and Mac OS X

In **Finder**, go to **Go** and select **Connect to Server**. Put in the network port IP address that you want to access. Click **Connect**.



It will bring up a window requesting account and password. Please put in your account and password. Click **Connect**.

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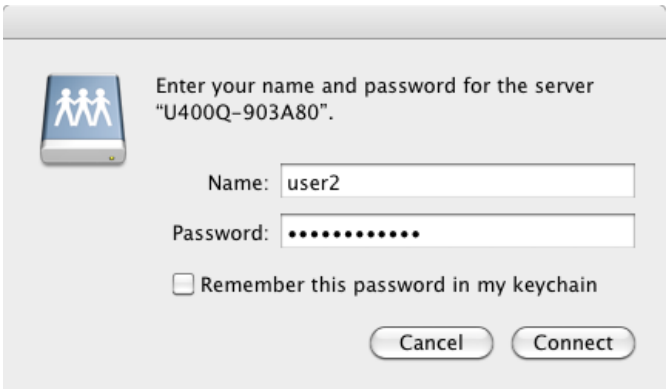
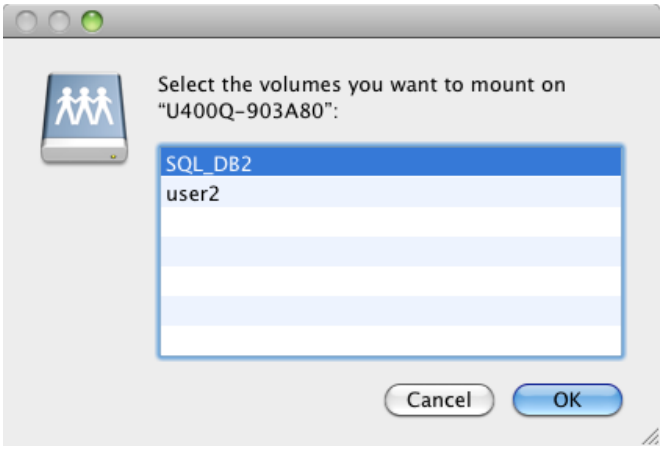


A window with all accessible shares for AFP protocol will pop up for you to select the share you want to connect to. Click **OK**.



There you go. The share is ready for you to access.

Apple Time Machine Support

It's very easy and straight forward to use Apple Time Machine with the unified storage. Simply follow the same instructions above to create AFP shares on the Mac machine and do the steps below.

1. Go to Time Machine function.
2. Turn on Time Machine. Click **Select Disk**.
3. Select the share and put in account and password again.
4. Start Time Machine operation.

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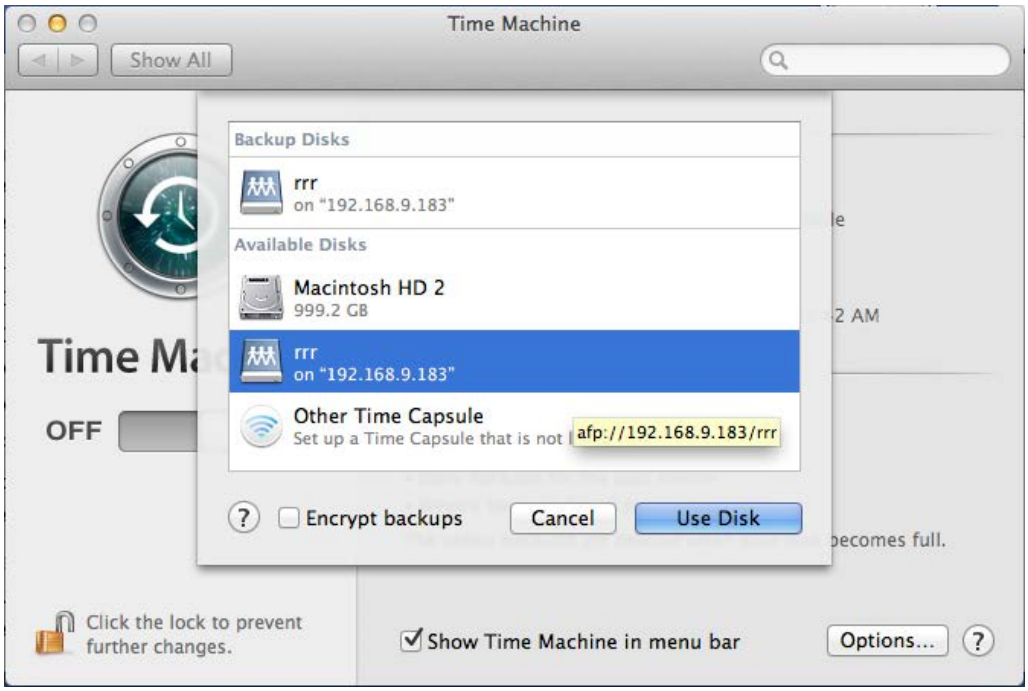
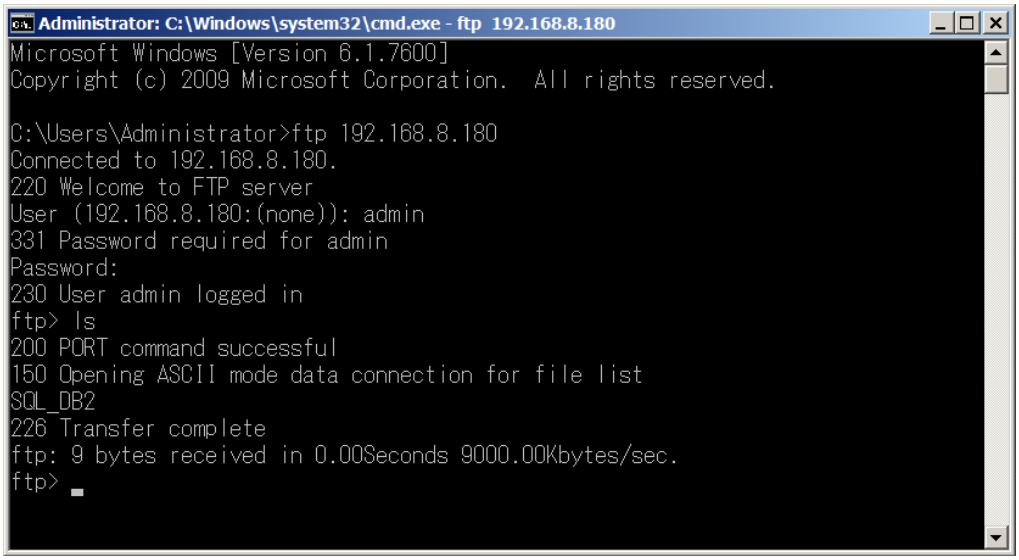


FTP

FTP is the basic file transfer tool provided in almost all operating systems. You may use FTP function through command line shell, FTP client, or web browsers.

Method 1: Using Command Line Shell

In Windows XP or Windows 7, open a command line window and use FTP command – "ftp". Enter your account and password. The share is available for you to access.


Administrator: C:\Windows\system32\cmd.exe - ftp 192.168.8.180
Microsoft Windows [Version 6.1.7600]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.
C:\Users\Administrator>ftp 192.168.8.180
Connected to 192.168.8.180.
220 Welcome to FTP server
User (192.168.8.180:(none)): admin
331 Password required for admin
Password:
230 User admin logged in
ftp> ls
200 PORT command successful
150 Opening ASCII mode data connection for file list
SQL_DB2
226 Transfer complete
ftp: 9 bytes received in 0.00Seconds 9000.00Kbytes/sec.
ftp>

In Red Hat Linux, it looks like the screenshot below.

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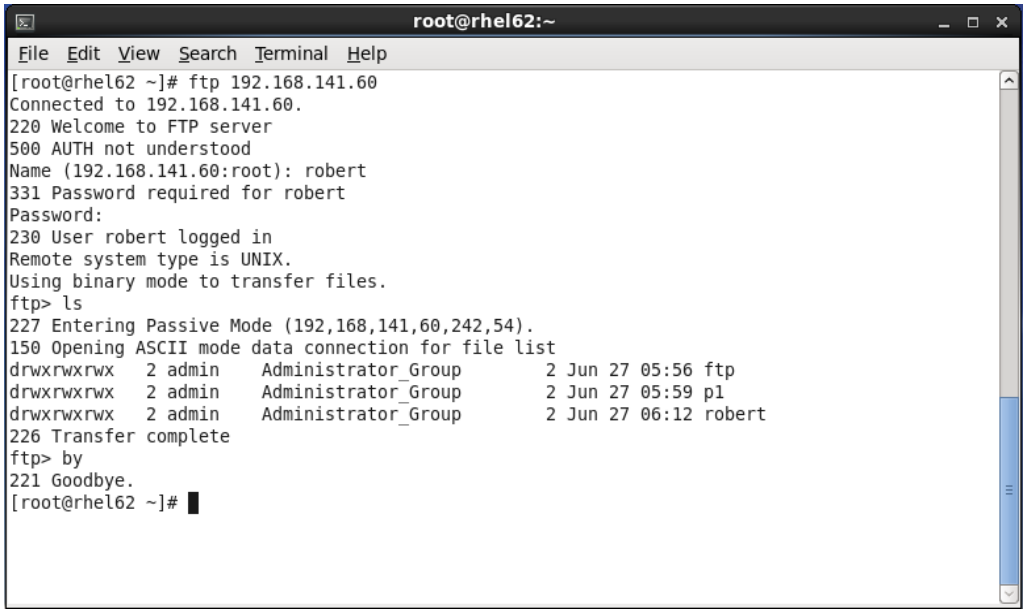
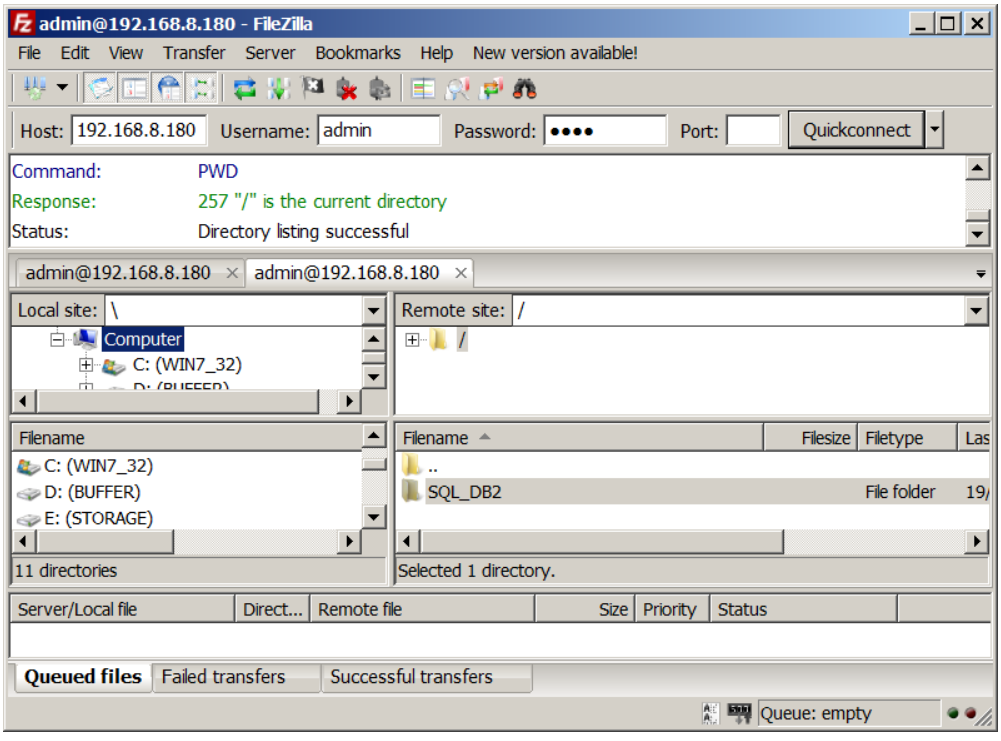

root@rhel62:~
File Edit View Search Terminal Help
[root@rhel62 ~]# ftp 192.168.141.60
Connected to 192.168.141.60.
220 Welcome to FTP server
500 AUTH not understood
Name (192.168.141.60:root): robert
331 Password required for robert
Password:
230 User robert logged in
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> ls
227 Entering Passive Mode (192,168,141,60,242,54).
150 Opening ASCII mode data connection for file list
drwxrwxrwx 2 admin Administrator_Group 2 Jun 27 05:56 ftp
drwxrwxrwx 2 admin Administrator_Group 2 Jun 27 05:59 p1
drwxrwxrwx 2 admin Administrator_Group 2 Jun 27 06:12 robert
226 Transfer complete
ftp> by
221 Goodbye.
[root@rhel62 ~]#

Method 2: Using FTP Client Application

There are a lot of FTP client tools in Windows platform such as WSFTP, FileZilla. In Linux X-Window environment, there are gFTP, WXftp, and LLNL XFTP.

For example, using FileZilla in Windows looks like the screenshot below.



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WebDAV

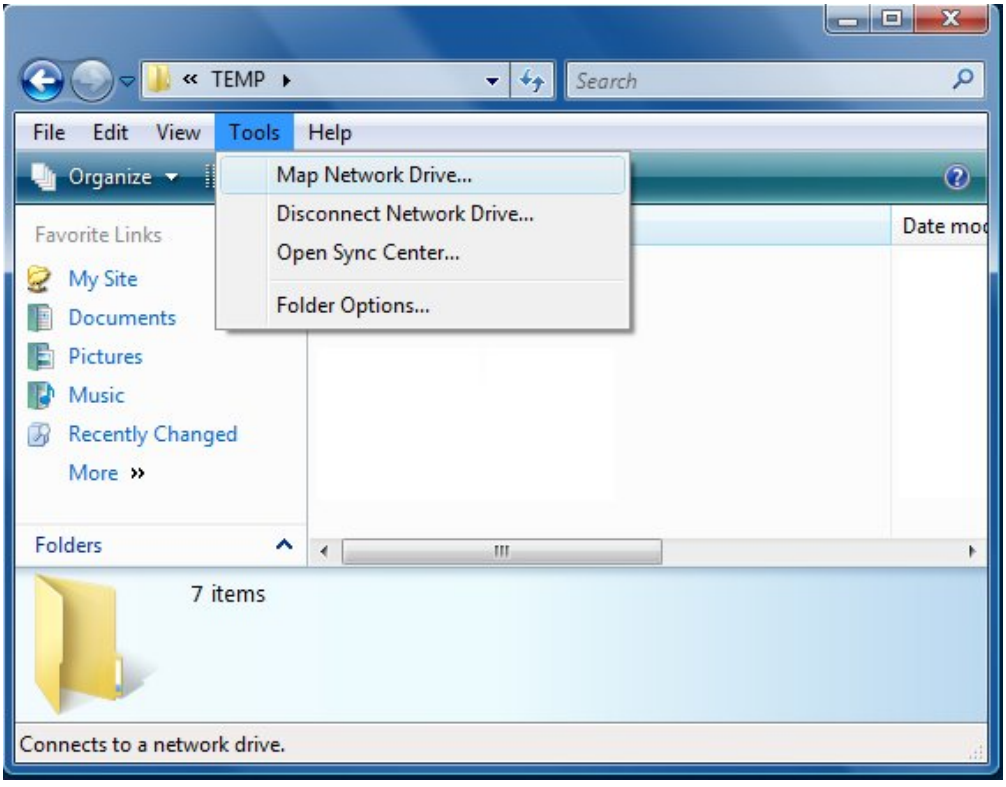
The Unified Storage WebDAV service supports the following operating systems :

- 32bit Windows : Windows XP SP2, Windows 7 SP1, Windows Server 2008 SP1
- 64bit Windows operating systems have issues to support WebDAV service. We recommend using 3rd party WebDAV client applications.
- 32bit Redhat Linux 5 and 6
- 64bit Redhat Linux 6

If you are using Windows XP or Vista, you may need to install a Windows update KB907306. If you are using Windows 7, please make sure **WebClient** service is enabled through **Component Services**. For more related information, please check WebDAV client interoperability at http://svnbook.red-bean.com/en/1.6/svn.webdav.clients.html

Method 1: Windows 7 Using Map Network Drive Wizard

From Windows Explorer, go to **Tools** and select **Map Network Drive**.



From Network and Sharing Center in the Control Panel, go to **Tools** and select **Map Network Drive**.

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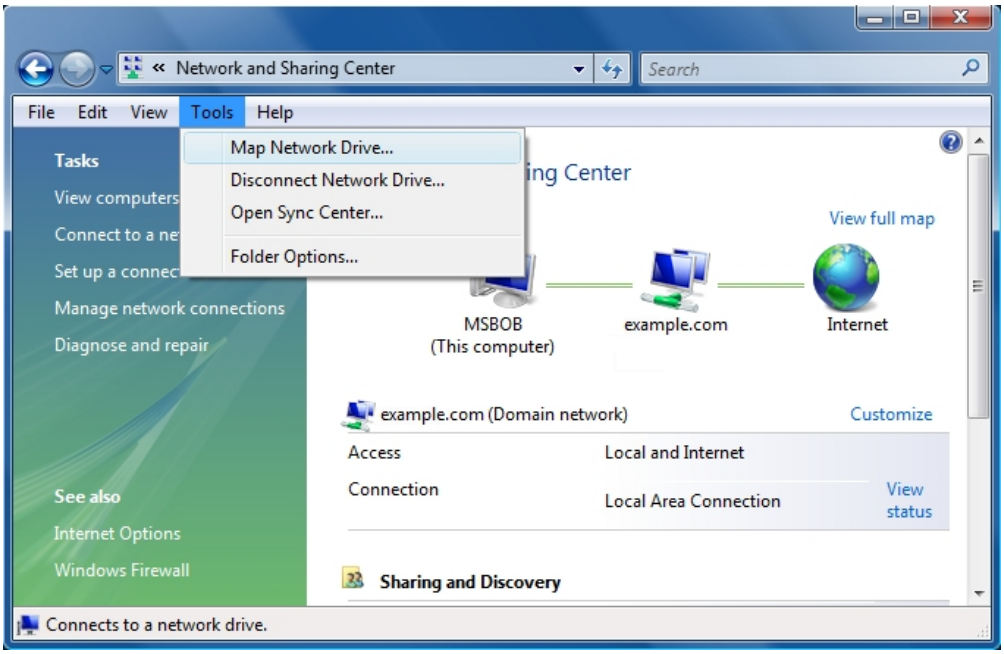
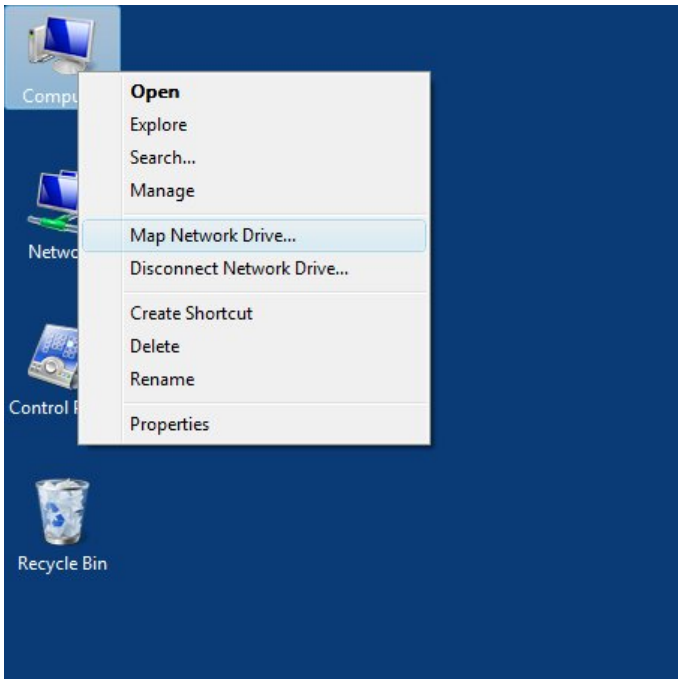


From the **Computer** icon on **Desktop**, right click on **Computer** icon and select **Map Network Drive**.



When the wizard appears, click **Connect to a Web site that you can use to store your documents and pictures**.

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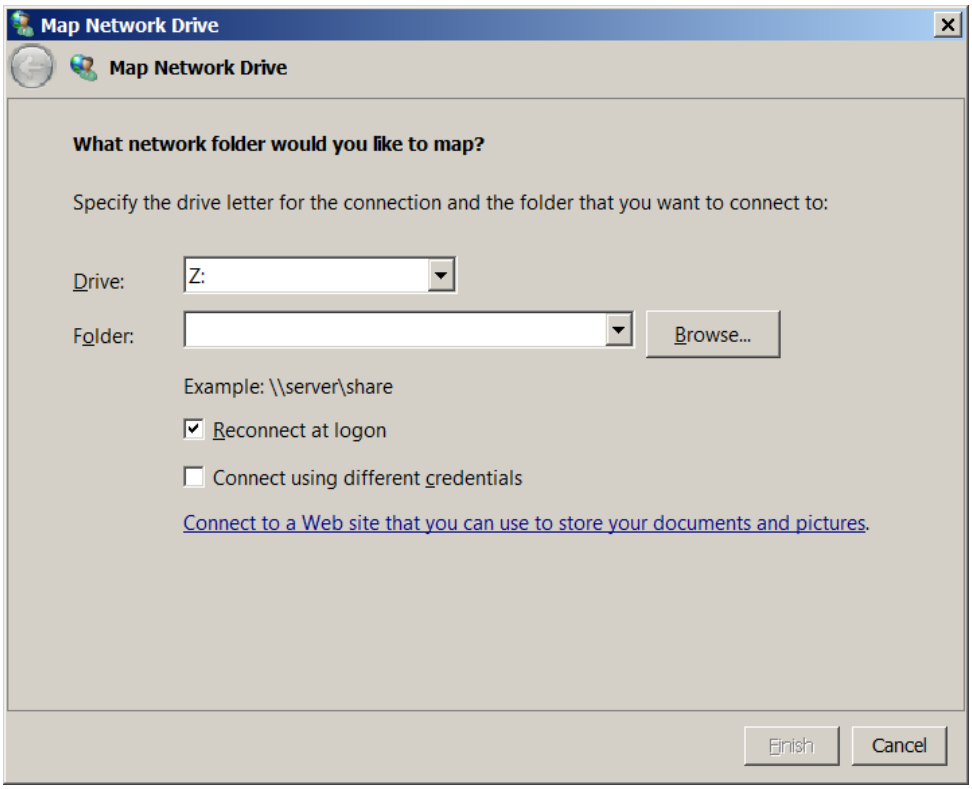
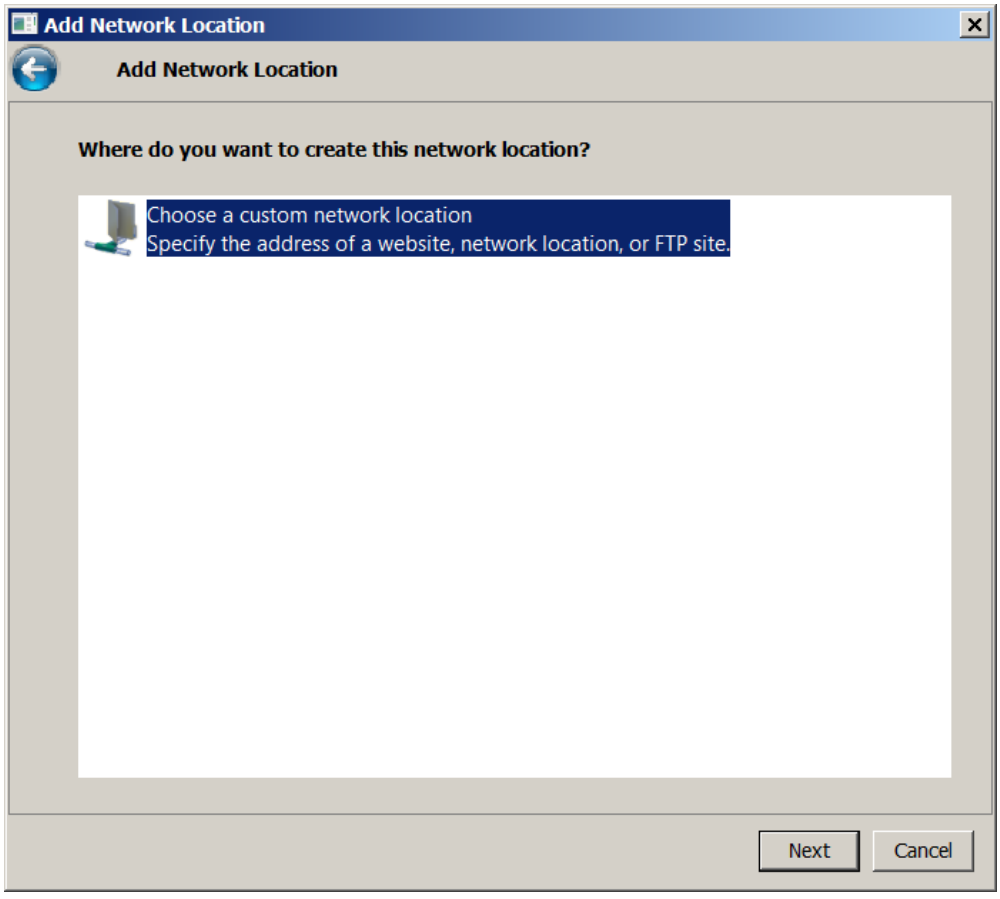

Map Network Drive
Map Network Drive
What network folder would you like to map?
Specify the drive letter for the connection and the folder that you want to connect to:
Drive:
Z:
Folder:
Browse...
Example: \\server\share
Reconnect at logon
Connect using different credentials
Connect to a Web site that you can use to store your documents and pictures.
Finish
Cancel

Follow the instructions and click **Next**. Select **Choose a custom network location** and click **Next**.


Add Network Location
Add Network Location
Where do you want to create this network location?
Choose a custom network location
Specify the address of a website, network location, or FTP site.
Next
Cancel

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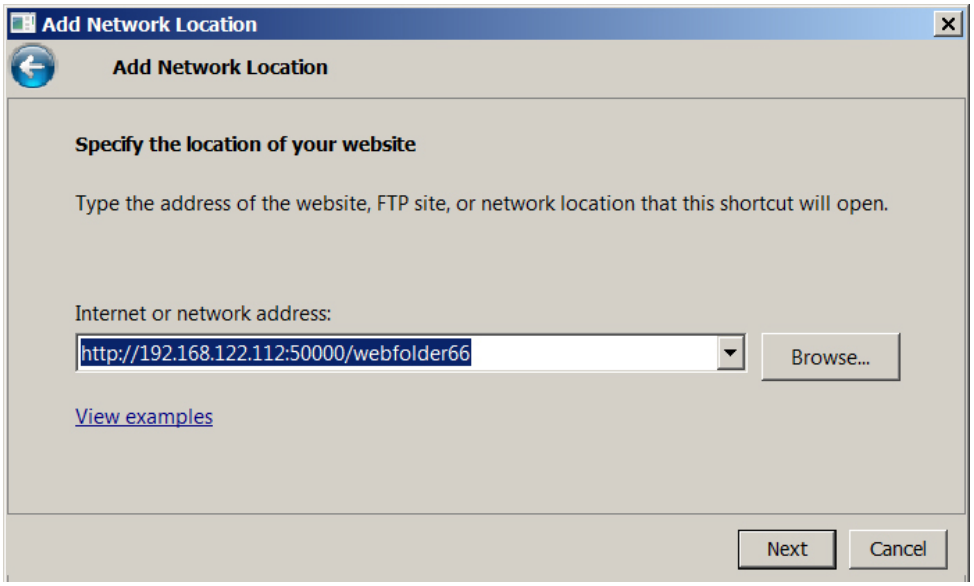
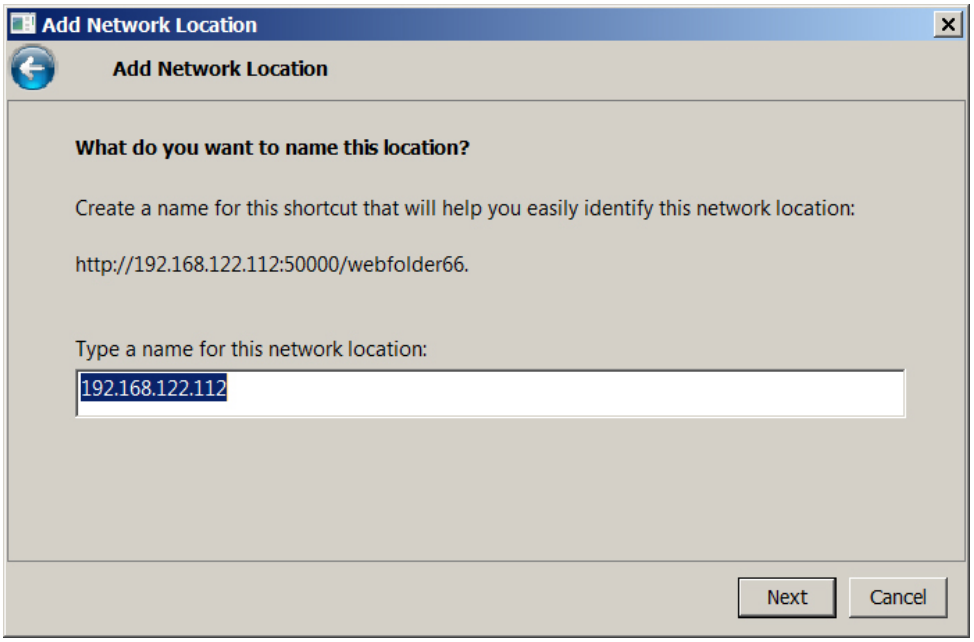
In **Internet or network address** input, put in the WebDAV share in the following syntax.

http://<IP address>: 50000/<WebDAV share>

Please make sure you put in the port number **50000**.



Put in the required account and password information. You may name the network location. Here we simply use the default as 192.168.122.112.


Add Network Location
Add Network Location
What do you want to name this location?
Create a name for this shortcut that will help you easily identify this network location:
http://192.168.122.112:50000/webfolder66.
Type a name for this network location:
192.168.122.112
Next
Cancel

You may access the web folder now.

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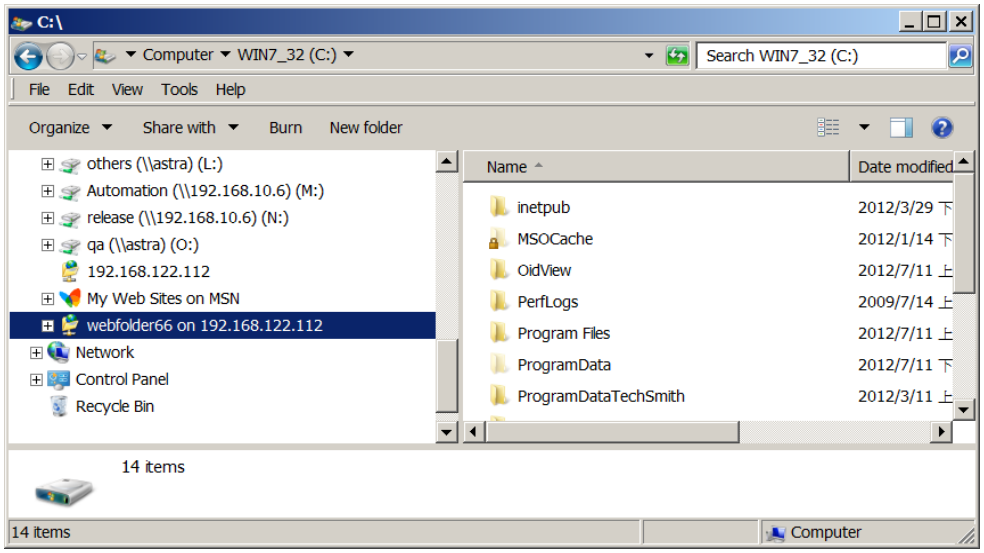

Method 2: Using 3rd Party WebDAV Client Appplication

Recommended tools include WebDrive, NetDrive, or Bitkinex.

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Software Application

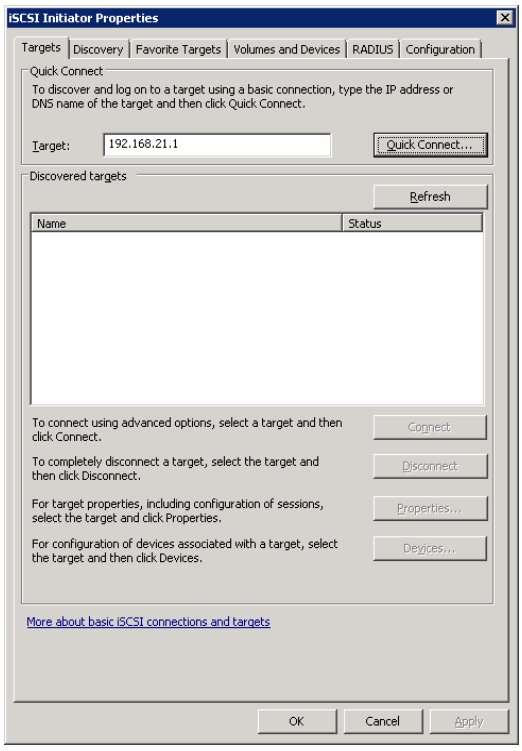
6

Microsoft iSCSI Initiator

Here are the step by step instructions of how to setup Microsoft iSCSI Initiator. Please visit Microsoft website for latest iSCSI initiator. This example is based on Microsoft Windows Server 2008 R2.

Connect to iSCSI Target

1. Run Microsoft iSCSI Initiator.
2. Input IP address or DNS name of the target. And then click **Quick Connect** button.


iSCSI Initiator Properties
Targets
Discovery
Favorite Targets
Volumes and Devices
RADIUS
Configuration
Quick Connect
To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.
Target:
192.168.21.1
Quick Connect...
Discovered targets
Refresh
Name
Status
To connect using advanced options, select a target and then click Connect.
Connect
To completely disconnect a target, select the target and then click Disconnect.
Disconnect
For target properties, including configuration of sessions, select the target and click Properties.
Properties...
For configuration of devices associated with a target, select the target and then click Devices.
Devices...
More about basic iSCSI connections and targets
OK
Cancel
Apply

3. Select the target name, and then click **Done** button.

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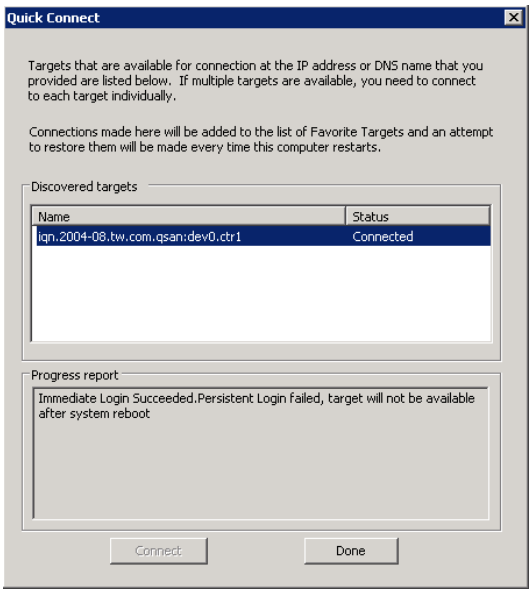
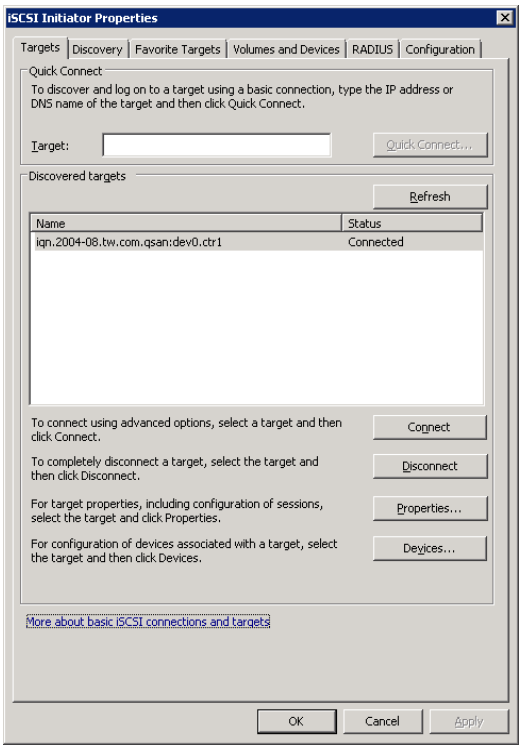
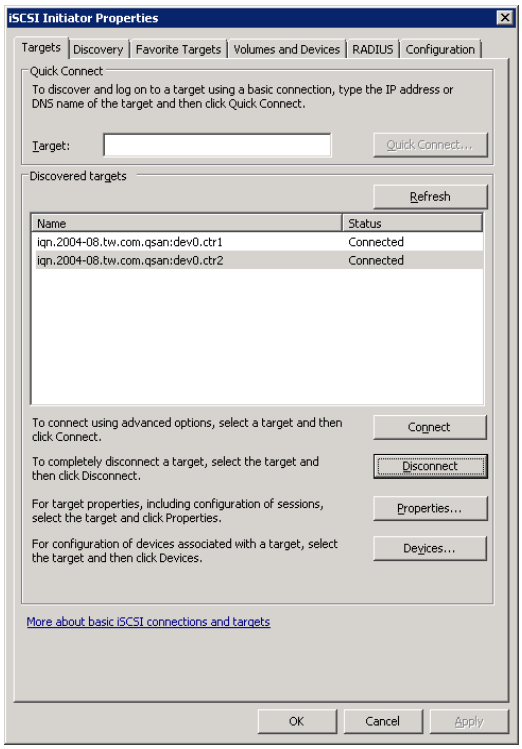

Quick Connect
Targets that are available for connection at the IP address or DNS name that you provided are listed below. If multiple targets are available, you need to connect to each target individually.
Connections made here will be added to the list of Favorite Targets and an attempt to restore them will be made every time this computer restarts.
Discovered targets
Name
Status
iqn.2004-08.tw.com.qsan:dev0.ctr1
Connected
Progress report
Immediate Login Succeeded.Persistent Login failed, target will not be available after system reboot
Connect
Done


iSCSI Initiator Properties
Targets
Discovery
Favorite Targets
Volumes and Devices
RADIUS
Configuration
Quick Connect
To discover and log on to a target using a basic connection, type the IP address or DNS name of the target and then click Quick Connect.
Target:
Quick Connect...
Discovered targets
Refresh
Name
Status
iqn.2004-08.tw.com.qsan:dev0.ctr1
Connected
To connect using advanced options, select a target and then click Connect.
Connect
To completely disconnect a target, select the target and then click Disconnect.
Disconnect
For target properties, including configuration of sessions, select the target and click Properties.
Properties...
For configuration of devices associated with a target, select the target and then click Devices.
Devices...
More about basic iSCSI connections and targets
OK
Cancel
Apply

4. It can connect to an iSCSI disk now.

Disconnect

1. Select the target name, click **Disconnect** button, and then click **Yes** button.



2. Done, the iSCSI device disconnected successfully.

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Advanced Operations

Terminal Operations

There are two terminal operations to manage and debug the storage system, these are described below.

Serial Console

At the rear of the storage system, connect a monitor via the VGA port and connect a USB keyboard via the USB port.

The initial defaults for administrator login are:

- User name: admin
- Password: 1234

Secure Shell Remote Access

SSH (secure shell) software is required for remote login. The SSH client software is available at the following web site:

- SSH Tectia Client: http://www.ssh.com/
- PuTTY: http://www.chiark.greenend.org.uk/

The default IP setting is DHCP, check the LCM to find the IP address. If your network does not have DHCP server, you will need to configure a static IP address. The remote control settings are on the following:

- Host IP: <*IP Address*> (e.g.: 192.168.10.50)
- Port: 2222
- User name: admin
- Password: 1234

TIP:
The system supports SSH for remote access only. When using SSH, the IP address and password are required for login.

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Console UI

When logged into the system, there is a prompt, type **help** and press **Enter** button. It will display help description.

```
console> help
  info          Print system information
  ifconfig      Setting eth0 IP address
  reset_network Reset all of network port to Manufactory setting
  restart_http  Restart HTTP service for management
  list_port     List the port number of service used
  diag          Print diagnostic message
  dump_sysinfo  Dump system information to USB
  exit          Exit
  help          Help description
console>
```

These options are available on the console UI:

- info**:** Print the system information.

```
console> info
  [System]
    Product:       DNS-1560-04
    Name:          DNS-1560-04-xxxx
    Version:       1.2.3
  [Network]
    LAN0 => MAC 00:13:78:xx:xx:xx  Addr:192.168.10.50  Mask:255.255.0.0
    LAN1 => MAC 00:13:78:xx:xx:xx  Addr:169.254.200.61  Mask:255.255.0.0
    LAN2 => MAC 00:13:78:xx:xx:xx  Addr:169.254.131.177  Mask:255.255.0.0
    LAN3 => MAC 00:13:78:xx:xx:xx  Addr:169.254.190.59  Mask:255.255.0.0
```

- ifconfig**:** Setup the IP address of the management port.

```
console> ifconfig
  Setting eth0 IP address usage:
        ifconfig IP MASK [GATEWAY]
        ifconfig DHCP
```

- reset_network**:** Reset all of network ports to factory default setting.
- restart_http**:** If the web UI is abnormal, restart HTTP service for management.
- list_port**:** List the port number of the services.

```
console> list_port
  [Service]             [Port]
    http                => 80
    https               => 443
```

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```
ssh                 => 2222
ftp                 => 21
sftp                => 22
webdav              => 50000
webdavs             => 8888
```

- diag**:** Print the diagnostic messages.
- dump_sysinfo**:** Connect a USB flash via USB port at the rear of the system, use this command to dump the system information on the USB device.
- reboot: Reboot the system.
- shutdown: Shutdown the system.
- exit: Exit the console UI.
- help: Display the help description.

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Glossary and Acronym List

Common Terminology

Item	Description
RAID	Redundant Array of Independent Disks. There are different RAID levels with different degree of data protection, data availability, and performance to host environment.
PD	The Physical Disk belongs to the member disk of one specific RAID group.
Pool	A collection of removable media. One pool consists of one or several RAID sets.
ZFS	ZFS is a combined file system and logical volume manager designed by Sun Microsystems. The features of ZFS include data integrity verification against data corruption modes, support for high storage capacities, integration of the concepts of file system and volume management, snapshots and copy-on-write clones, continuous integrity checking.
LUN	Logical Unit Number. A logical unit number (LUN) is a unique identifier which enables it to differentiate among separate devices (each one is a logical unit).
GUI	Graphic User Interface.
RO	Set the volume to be Read-Only.
DS	Dedicated Spare disks. The spare disks are only used by one specific RG. Others could not use these dedicated spare disks for any rebuilding purpose.
DG	DeGraded mode. Not all of the array's member disks are functioning, but the array is able to respond to application read and write requests to its virtual disks.
SCSI	Small Computer Systems Interface.
SAS	Serial Attached SCSI.
S.M.A.R.T.	Self-Monitoring Analysis and Reporting Technology.
WWN	World Wide Name.
HBA	Host Bus Adapter.
NIC	Network Interface Card.
BBM	Battery Backup Module

Data Service Terminology

Item	Description
CIFS	Common Internet File System. CIFS operates as an application-layer network protocol mainly used for providing shared access to files, printers, serial ports, and miscellaneous communications between nodes on a network.
SMB	Server Message Block. Same as CIFS.
NFS	Network File System. NFS is a distributed file system protocol originally, allowing a user on a client computer to access files over a network in a manner similar to how local storage is accessed.
AFP	Apple Filing Protocol, formerly AppleTalk Filing Protocol. AFP is a proprietary network protocol that offers file services for Mac OS X and original Mac OS. In Mac OS X, AFP is one of several file services supported

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	including Server Message Block (SMB), Network File System (NFS), File Transfer Protocol (FTP), and WebDAV. AFP currently supports Unicode file names, POSIX and access control list permissions, resource forks, named extended attributes, and advanced file locking. In Mac OS 9 and earlier, AFP was the primary protocol for file services.
FTP	File Transfer Protocol. FTP is a standard network protocol used to transfer files from one host or to another host over a TCP-based network, such as the Internet.
WebDAV	Web Distributed Authoring and Versioning. WebDAV is an extension of the Hypertext Transfer Protocol (HTTP) that facilitates collaboration between users in editing and managing documents and files stored on World Wide Web servers.
Thin Provisioning	Thin provisioning is the act of using virtualization technology to give the appearance of having more physical resources than are actually available. The term thin provisioning is applied to disk later in this article, but could refer to an allocation scheme for any resource.

iSCSI Terminology

Item	Description
iSCSI	Internet Small Computer Systems Interface.
LACP	Link Aggregation Control Protocol.
MPIO	Multi-Path Input/Output.
MC/S	Multiple Connections per Session
MTU	Maximum Transmission Unit.
CHAP	Challenge Handshake Authentication Protocol. An optional security mechanism to control access to an iSCSI storage system over the iSCSI data ports.
iSNS	Internet Storage Name Service.

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